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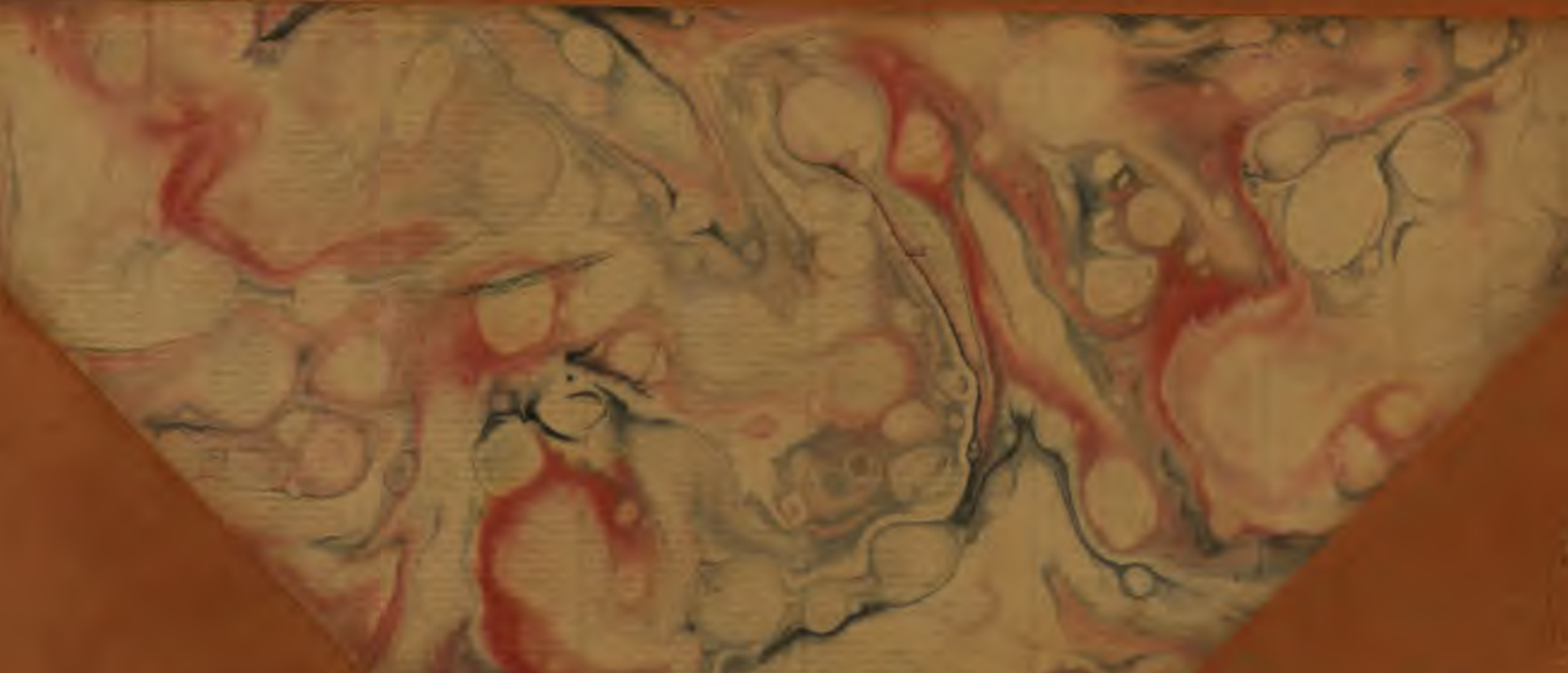

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GIFT OF

James T. Moynihan

THE FIRST CO-OPERATOR

"There never was a good war nor a bad peace."

Camp
Co-operation

Book of Proc[illegible]

Speakers:

J. B. McC[illegible]
Frank V[illegible]
Hon. John H. R[illegible]
[illegible]
S. O. R[illegible]son
Anson W. [illegible]hart
Hon. Willard H[illegible]
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Dr. Charles P. Ste[illegible]metz
F. P. Fish
Henry L. Do[illegible]erty
J. Robert Crouse
J. M. W[illegible]keman
W. F. Roberts[illegible]
Dr. Thomas D[illegible]ngton
Frank W. S[illegible]
Norman Mac[illegible]
D. L. Gaskill
[illegible] McCleary
F. E. Watts

Association Island, 1913

THE FIRST CO-OPERATOR

"There never was a good war nor a bad peace."

Camp Co-operation

Book of Proceedings

Speakers:

J. B. McCall
Frank Vanderlip
Hon. John H. Roemer
Samuel Insull
S. O. Richardson
Anson W. Burchard
Hon. Willard Howland
Elbert Hubbard
Dr. Charles P. Steinmetz
F. P. Fish
Henry L. Doherty
J. Robert Crouse
J. M. Wakeman
W. E. Robertson
Dr. Thomas Darlington
Frank W. Smith
Norman Macbeth
D. L. Gaskill
E. McCleary
F. E. Watts

Camp

L

Association Island, 1913

DEDICATED TO THE SPIRIT OF HARMONY AND CO-OPERATION
AMONG ELECTRICAL MEN AS A COMPLIMENT TO
THE MASTER WORKER,
THOMAS A. EDISON,
BY THE
ASSOCIATION ISLAND CORPORATION

LOAN STACK

GIFT

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PRINTED AT THE
ROYCROFT SHOP
EAST AURORA
NEW YORK

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U4 A1
C24

Thomas A. Edison

planned ...

one ...

From the ... of

Thomas A. Edison

... Orange, N. J.

Society for Electrical Development,
New York, N. Y.

Gentlemen:-

I have been ... reading the pamphlet dealing with the ... and ... of membership of your Society, and am ... with the wisdom displayed in its ...

It is indeed ... that ... of ... phenomenal growth and having ... there could be evolved a plan sufficiently ... to at once bring about an incalculable increase of business ... good of all concerned while not in the least disturbing the benefits of proper competition.

If the objects of your Society are carried out ... now proposed I think the next few years will ... an enormous advance in the use of electrical devices.

Yours very truly,

Thos. A. Edison

Thomas A. Edison

The one disappointment of the gathering at "Camp Co-operation" was due to the fact that Thomas A. Edison was unable to be present, although he had planned until the last moment to attend. Mr. Edison sent each one present at "Camp Co-operation" a personally autographed copy of the following letter:

Cable Address "Edison, New York"

From the Laboratory
of
Thomas A. Edison,

Orange, N.J. November 4th, 1913.

Society for Electrical Development,
New York, N. Y.

Gentlemen:-

I have been greatly interested in perusing the pamphlet dealing with the principles, plans, and the methods of membership of your Society, and am much impressed with the wisdom displayed in its conception.

It is indeed remarkable that, in a business of such phenomenal growth and having such keenly competitive interests, there could be evolved a plan sufficiently comprehensive to at once bring about an incalculable increase of business to the good of all concerned while not in the least disturbing the benefits of proper competition.

If the objects of your Society are carried out as now proposed I think the next few years will show an enormous advance in the use of electrical devices.

Yours very truly,

Thos A Edison

FOREWORD

YOU will be interested in knowing that this book is the fruit of the Co-operative Spirit of the distinguished men who made the addresses it contains, and a representative audience which enjoyed the rare treat. It was thought by the officials of the Association Island Corporation that much good would result to the electrical industry by arranging for this meeting of Presidents of Electrical Associations, Operators of important electrical properties, Members of State Utility Commissions, Financiers, Engineers and Publicists. It was felt that the ease and freedom of camp-life and out-of-door atmosphere would quickly develop a goodfellowship and camaraderie not attainable under more formal surroundings. It was further believed that the inspiration and education of a comprehensive program by leaders in our own, and the general business world, could be passed on, by the Presidents and others present, to large numbers of electrical men.

The high character of meeting and program may be inferred from the remarks of Mr. J. B. McCall, President of the Philadelphia Electric Company and the National Electric Light Association, who acted as Chairman of the sessions of the business program:

"I have been attending conventions for a good many years and have presided over many of them, but I don't think I ever saw at any convention a list of subjects handled by such a list of speakers as you gentlemen have had at this meeting, and certainly there must be some profitable lessons that we can learn from our experience of the week."

It is the hope of the officers of the Association Island Corporation that these addresses and discussions in book form may have a wide circulation, and thus extend the benefits of the meeting to as many as possible.

The publisher's notice on another page will give complete information as to the conditions under which single copies or quantities of this book may be secured.

LIST OF ADDRESSES

LIST OF ADDRESSES—(CONTINUED)

SUMMARY

EXHIBITION OF EDISON'S MOVING PICTURE FILMS

ON Wednesday Evening, September Third, several reels of moving pictures were shown to illustrate the idea upon which Thomas A. Edison is now working to turn motion pictures to educational uses. For instance, one film was, in itself, a course in elementary electricity and magnetism, while another was a biological study of moth development. Later, Chairman E. H. Haughton asked Mr. Samuel Insull to tell something of his early association with Edison and Menlo Park. Mr. Insull spoke as follows :—

Gentlemen, I had no idea of being called upon to talk to you this evening, but when sitting here watching those films it very much reminded me of a great deal of Mr. Edison's early work. I remember one evening about nine o'clock, in the little brick building that was his library at Menlo Park, he asked two of his mathematicians to figure out the cubical contents of an incandescent lamp globe. They went to work to do the figuring. Mr. Edison sent me into the chemical laboratory for an incandescent lamp globe, which he told me to fill with water, and bring him a graduated glass; and he poured the contents of the lamp globe into the chemist's graduated glass, and showed me the cubical contents of a lamp globe. He then went to sleep. Whenever he was working all night, he had a convenient cot to rest on whilst the other fellows were blunting their pencils. At about five o'clock next morning he asked one of the mathematicians whether he had figured out the cubical contents of the lamp globe. He then told him to do exactly what he told me—to go and get a lamp globe and fill it with water, and get the chemist's graduated glass, and that would show him the cubical contents of the lamp globe.

That was practical mathematics, and the experiments that you

have seen depicted on the sheet tonight are very illustrative of Edison's method of working. I remember that when he was figuring out the necessary mains and feeders for the first distribution system he erected in New York, he had the district thoroughly canvassed, and then out at Menlo Park, in a room not unlike this, in the upper floor of his chemical laboratory, he had a big board against the wall, and a series of small resistances to represent load, and from the data he had, and with the aid of that board, he laid out the first practical distribution system. He got at it from the rough-and-ready experimental point of view. Most of his work in the early days was of that character. While he was surrounded by mathematicians capable of doing the necessary figuring, provided they had the necessary information, he relied to a great extent upon his own rough-and-ready experimental ideas. In looking on the sheet tonight, it seemed to me that he was trying to apply the same methods for the purposes of education. I know that for a number of years back he has had in mind bringing the moving picture business to a point where it would be of use in educating the youthful mind.

This island is especially connected with the lamp industry. The development of the incandescent lamp, in its early stages, was brought about by just such similar experiments as you have seen on the sheet tonight. It was an untrodden path entirely. Mr. Edison conceived the idea that what was popularly called the subdivision of the electric light could only be brought about by the production of a lamp of high resistance. The experiments that finally produced the old carbon lamp were practically a series of cut-and-try-again experiments. First, Mr. Edison tried metallic filament lamps, and I think you will find in some of his earlier caveats, in which he tells of his experiments in efforts to change the character of platinum so that it would give off incandescence for light, and have a reasonable length of life, he mentioned a number of different metallic substances that might possibly be used, and I think you will find osmium as one of the substances he suggested which could be used for that purpose. The platinum lamp was not a commercial success. I think it was Professor Morton, of Stevens

Institute, in lecturing before his class on one occasion, who showed an experimental platinum filament lamp, which, in the experiment, was destroyed. He confidently informed his class—this must have been somewhere around 1878, early in 1878—or possibly the end of 1877—that this was probably all that would ever be heard of the Edison incandescent light.

The platinum filament was followed by the cardboard filament. I first saw a cardboard filament lamp operated by the energy supplied by some primary batteries in London about 1880. The paper filament lamp proved to be a failure commercially, although successful experimentally. Mr. Edison ransacked the whole world to find materials that could be used for the purpose of lamp manufacture. He sent men to the slopes of the Andes. He sent men, at a time when travel was much more difficult than it is today, to the interior of Japan. He finally found a certain class of bamboo in one of the Japanese trade ports that could be used for the purpose, and the incandescent lamp manufacture was brought to a commercial success in about the year 1881, so far as the use of the lamp was concerned, the filament being composed of bamboo. You gentlemen in this room know what has happened since then.

To me it is an especial pleasure that a group of men engaged in the incandescent lamp business upwards of thirty years after the first experimental work was brought to a success, should receive the name of the great master of our industry so cordially as you have tonight, and I am sure that if he were here he would appreciate it just as much as I have.

ADDRESS OF WELCOME TO CAMP CO-OPERATION

By S. O. Richardson, Jr.

GENTLEMEN, on behalf of the Association Island Corporation, I extend to you a most hearty welcome. When a few of us purchased this island some years ago to give co-operation a thorough trial, we little thought that we would be so soon honored by your presence at this the cradle of co-operation.

True co-operation means honesty and integrity, the live-and-let-live principle in business, coupled with proper reward for original invention, and when this has been once established, a free interchange of information will result, thereby enabling you to furnish the commodity at a reasonable price and of a quality that can be obtained in no other way, thus insuring much benefit to the people at large. In the olden days we had unrestricted competition, then the combination and trade agreement, then the trust, all illegal under present laws, and which never would have accomplished the purpose for which we aim. To my mind co-operation in any industry is the solution of its problem. It is the twentieth century method.

It is our hope that your stay with us will be so pleasant and that you will be so impressed with our methods that you will form a permanent organization and meet with us annually.

It now gives me great pleasure to introduce to you Mr. Burchard, who will speak for Association Island.

ASSOCIATION ISLAND

By Anson W. Burchard

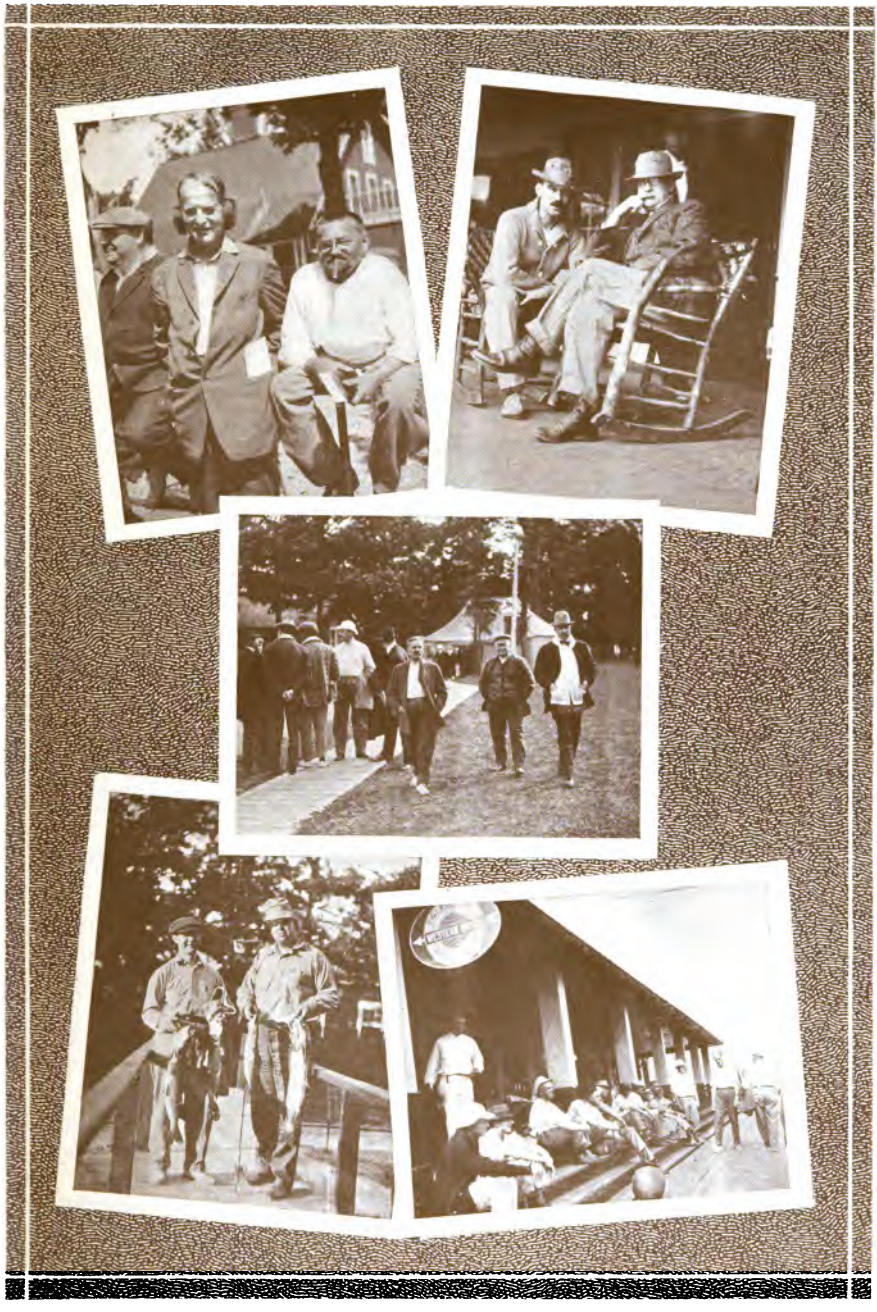
GENTLEMEN, these men who have been directly identified with the development of Association Island are so modest that they have requested me, who have been an observer of, rather than a direct participant in, what has been accomplished here during the past few years, to say a few words briefly reviewing the history of Association Island during the past few years. In order that I may avoid error, I am going to take the liberty of reading a few statements in regard to Association Island.

The shores of the State of New York bordering on the Northern end of Lake Ontario constitute a region which has been the scene of many events of historic interest since the first invasion of this part of the country by the whites, two hundred years ago.

The home of the Oneidas and Onondagas, members of the Iroquois tribe, it was the scene of many contests incident to the struggle between the English and the French for possession of that part of the continent of North America which now constitutes the Dominion of Canada. In this contest, the final outcome of which was not determined until after nearly a century of strife, the alliance with the English of the ferocious, cruel, warlike Iroquois was of important advantage to them and contributed in a large measure to their ultimate conquest of the territory.

Early in 1756 Captain DeVillier, a prominent leader of the French in Canada, with eight hundred Canadians and Indians, established a post at the head of Nioure Bay, as the waters of Henderson Harbor were called by the French. A stockade of logs set upright in the ground, the usual type of construction, was erected on this island, and the post was named Camp de L' Observation, in that it constituted a point of vantage for watching the channel between the mainland and the island.

ANSON W. BURCHARD



In July, 1756, Montcalm landed on this island with a force of French and Indians, constructed ovens under the protection of the stockade, and baked bread for his army.

About the latter part of 1757, the post, Camp de L' Observation, was abandoned and the forces moved to Fort Frontenac on the Canadian shore of the lake.

Following the retreat of the Indians before the advance of the colonists, there was a period of peace, until the wars with the mother country, when the neighboring Sacketts Harbor became an important post, and is still continued as a military establishment by the United States.

About ten years ago, a small group of men connected with the electrical industry were attracted to this spot by the unusual fishing in the adjacent waters, and found it a delightful place for vacation recreation. The enthusiastic accounts they gave of their experiences excited the interest of their associates and the demand for more adequate and permanent accommodations soon made itself felt.

This resulted in the purchase of this island in 1907 and the organization of the Association Island Corporation by Messrs. Richardson, Terry, Morrison, Page and Hills, to whom the credit for the initiation and success of the undertaking is primarily due.

At the beginning the accommodations were very simple and the number of those who availed themselves of the privileges which the island afforded was relatively small. But the scope of the plan has broadened rapidly. More comfortable arrangements have been provided; the facilities for recreation have been greatly improved, and those who are honoring us as guests will have the opportunity of judging for themselves the measure of success which has attended the effort.

During these six years of evolution, however, the one fundamental element of real success has been carefully preserved—the spirit of Association Island—thoroughly democratic; free from pretense; honest, straightforward, every man estimated by his own character and personal worth regardless of the business or social position he might occupy. To that end the condition of

great simplicity in respect to dress and entertainment has been insisted upon and a relationship of unaffected, generous, honest camaraderie established. This has constituted continuing inspiration to those who have felt its influence to meet their associates with cordiality, frankness and sincerity.

It soon became apparent that these conditions constituted a most favorable atmosphere for meetings where matters of general interest could be considered, and during September of last year, representatives of the National Electric Light Association, the National Electrical Supply Jobbers' Association, the National Electrical Contractors' Association, and of the manufacturing interests met here to discuss means of securing more effective co-operation between the several branches of the electrical industry in promoting its progress, considering the electrical industry in its broad sense as embracing the generating and distributing of electric current as well as the manufacture and installation of the devices necessary for that purpose. And it is in the hope of inspiring a greater interest in this important and interesting subject, and by bringing you into contact with the influences of this island, of causing you to become imbued with the spirit of co-operation which is one of the most pronounced characteristics of the gatherings here, and of encouraging the most cordial and friendly personal relations founded upon the knowledge of character which is best obtained through contact under conditions free from conventionality, that we have asked you to honor us as our guests.

In our earnest desire that each guest shall feel entirely free and at home, and in harmony with the spirit of Association Island, we are most fortunate in having for chairman of these meetings a man who has been prominently identified with the electric lighting industry for many years; who has manifested an active and sympathetic interest in the movements intended to promote progress in its development not only technically and commercially but as well along broad lines of public welfare and convenience, and whose cordial and delightful personality will cast a glow of genial welcome over this gathering: Mr. Joseph B. McCall, President of the National Electric Light Association.

J. B. McCall

ACCEPTANCE AS CHAIRMAN

By J. B. McCall

I THANK you most heartily, gentlemen, for your kindly welcome and the very flattering words that Mr. Burchard has used in introducing me. I am very glad to receive an invitation to come to this meeting, especially because of its purpose. I am frank to say that I approached the visit with some perturbation, having heard some rules governing the conduct of the visitor to the island. I was very glad to find, as I left the wharf this morning, that those rules have been abolished for the time being.

I am reminded a little bit of an old fable I read years ago, of a fox seeing a nice fat pullet in a tree by the roadside and begging it to come down and play with him. With the natural instinct of her kind, the hen refused, but the fox assured her that there had been a proclamation made the day before that all the birds and animals should live together, and that the millennium had come. The hen was almost persuaded, but all of a sudden the baying of a hound was heard in the distance, and the fox began to slip away. "What is the matter with you?" asked the hen. "That hound won't hurt you—there has been a proclamation, you know." "Yes," replied the fox; "but maybe that son of a gun has not heard the proclamation." So I feel a little bit wary now.

As president of the National Electric Light Association, anything, of course, that tends to promote co-operation in the industry naturally appeals to me. And as I look over the program which was handed to me only an hour ago, so that in some measure I am unprepared, I can see here gathered all the elements which certainly, if combined, would make for the greatest possible co-operation in our industry. First we have the government represented,

then the financier, then the manufacturer, and the operator, and the heads of various technical organizations, all of whom, it is safe to say, have as much interest in the final outcome of this industry as any one of us individually. The operator certainly knows the need for co-operation in his business, and the operators, as you all know through their associations, have for years met and exchanged observations, and this has led to great advance in the art. Government, of course, for a while looked rather carelessly at the situation. Utility didn't really exist, it only meant that those few apostles of the past were impelled, through sheer faith, to go on and blaze the path we see today. The financier rather sparingly aided the operator in those days. I am glad to say that in the past year the securities of our industry have been looked upon by banks as very stable securities. The manufacturer, too, has learned the necessity for co-operation with the operator. I think sometimes at least that they get together, and we all have more knowledge than we had before, and there are fewer mistakes for the manufacturer to take advantage of. I say that impersonally, of course.

Now, it is to be hoped that if the government and the financier, and the operator, and the manufacturer represented here can come together, results can come from this meeting that will be of the greatest advantage to us, and I hope that will be the outcome of this meeting.

It is unnecessary for me to introduce to an audience of this kind, composed of men in our industry, the first speaker of the day. Those of us who have been operating companies for many years really regard him as without a peer in our business. I have the honor of presenting Mr. Samuel Insull, President of the Commonwealth Edison Company, of Chicago.

DISTRIBUTION OF ELECTRICAL ENERGY, PRESENT AND FUTURE

By Samuel Insull

MR. CHAIRMAN AND GENTLEMEN, it is a very great pleasure to me to be present at a meeting of this character, in this location, gotten up mainly by the people interested in the incandescent lamp business. Unless my friend, Mr. E. W. Rice, anticipates me in the lamp business, I think I am the oldest lamp manufacturer in point of years, on this island today. I think the first manufacturing cost sheet that I ever got out on the cost of lamps was for the month of March, 1881, thirty-two years ago. The cost of the lamps the first month, as I remember it, was about $1.50 to $1.75 apiece, and we were selling them for thirty-five cents apiece. It was not a very good commercial proposition at that time, and if my memory serves me rightly—if Mr. Morrison had been here he would have been able to assure me of the fact—I think that the first specimen of electric transmission that I ever saw was the transmission line running from the old machine shop at Menlo Park upon the hill, to a point about a half a mile, maybe not as much as that, probably a quarter of a mile, east of the present Menlo Park depot on the Pennsylvania Railroad. The building where the motor was installed was burned down some years ago. It was the first commercial incandescent lamp factory in this or any other country. I am inclined to think that a portion of the operations were run by a bi-polar machine, constructed on the lines of the old Edison design of bi-polar generators, necessarily a direct current generator at that time, the source of power being, as I have stated, upon the hill, probably three-quarters of a mile

away. That is my impression; I know the motor ran there, and I know that a very few years ago that same motor was in use at the Harrison factory of the General Electric Company.

I have been asked to speak to you on the question of the transmission of energy, which is probably one of the most important subjects, not alone to us but to everybody else in this great country. It is a serious question as to whether the economical production and transmission of energy is not a more important matter than the economic administration of the transportation systems of the country. If you will go back but relatively a few years and seek for the foundation of a number of the great manufacturing industries that are situated to the southward and to the eastward of us, you will find that long before there was any great unified system of transportation existing in this country, the manufacturing interests represented today by enormous establishments, were at that time situated very largely where they are today, but were of necessity very much smaller, and they were usually situated on some New England stream where power could be developed cheaply. You see the remnants of those small water-powers even to this day; some that have been abandoned by the manufacturers have been taken up in this generation by manufacturers of a different class of product, by manufacturers of kilowatt hours, and as you go along the marvelous roads of Vermont and New Hampshire and view the scenery in what may well be called the playground of America, you will often come across a small water wheel with a single generator attached, and if you will follow the leads running off from that machine you will find lines extending in every direction, and that water-power is the source of energy for maybe ten, fifteen, twenty, or thirty miles of transmission lines.

The business of the production of energy started from the other end, not from a cheap source of power, but really from a very expensive source of power. Some thirty years ago the illustrious inventor, whose genius is proclaimed by every incandescent lamp produced in the world, for his is the credit of founding the great industry with which we are connected, I refer to Mr. Edison—

installed the first generating station and distribution system in the lower part of New York, a district bounded by Wall Street on the south, the leather district on the east, Fulton Street on the north, and I think Nassau Street on the west. At that time the business of producing and distributing energy was mainly for the purpose of producing light through the use of the incandescent lamp. The business of supplying power was, so to speak, a by-product, just as much a by-product of the electric lighting business of that day as coke and tar and ammonia are by-products of the gas business of today. Notwithstanding that the incandescent lamp business has grown so that a hundred millions of lamps are consumed in this country in a year, today the electric lighting end of our business is destined to become very largely a by-product. That side of our business thirty, twenty, even ten years ago was the main portion of our business, from which we got the necessary income in order to pay a return to those investing their capital in our business. Although of so great importance as late as ten years ago, today, in looking to the future, I think that it is perfectly safe to say that the lighting end of the business will be the by-product side of the business, and I think the main income for a return on our investment will come from the power business.

A few figures will show you what I have in mind. At the present time, in any real large central station system where the entire energy requirements of the community outside of the isolated plants is supplied from one source—and that to my mind is the only economic way, as I shall dwell upon further later on, of producing energy—the amount of energy used for incandescent lighting, as far as we are able to check it, is not more than from 27 per cent, under the best conditions, to 45 per cent, under not as good conditions, of the current produced at the station.

The money figures are somewhat different. It is very difficult to get down to exact figures on the lighting side of the business, for the reason that a great deal of power and a great many miscellaneous devices are on our lighting circuits, and the current used by those devices is metered as lighting current. Therefore,

when the consumers bills are rendered, they are rendered as lighting bills. But take the principal property that I myself have charge of, the Commonwealth Edison Company, its income from lighting today, although it has more customers than any central station company in the world, is only 47 per cent of its total revenue. Its output for lighting is 25 per cent of its total output.

You will understand, therefore, why I take the position that our business is decidedly a power business rather than a lighting business, and our function is to produce the energy that is required in a given territory, whether that energy is used for purposes of lighting, for purposes of stationary power, for industrial purposes, or for purposes of transportation. Just as inevitably as the sun rises and sets, so to my mind it is inevitable that eventually the production of energy for any given community or any given territory, whichever may be found to be the economic basis to operate on, the control of that production and the control of the distribution must be just in the hands of one organization. If it can not be done any other way—if that result can not be obtained through the medium of private capital, I feel so strongly as to what must finally take place, that in my judgment it will become a public function. It rests largely with the people in this room as to whether it shall be done by private capital in this country, or whether it shall be done as a governmental operation.

If I were addressing an audience of laymen, I would probably trace the various conditions that have led up to this situation, but most of you people in this room are closely identified with one side or the other of the electric light and power industry, either the manufacturing side of the business or the operating side, and if you will think but for a moment, you must agree with me that the development of the apparatus of largely the last ten years has led up to the situation such as I have described it to you. It is the development of the rotary transformer, its perfection as a piece of apparatus, the development of the turbo-electric generator, those two things above everything else. To these might be added the improvements in construction and efficiency of static transformers. These three elements have led to the

building of very large generating stations and the development of great distribution systems to carry away the energy produced at these stations.

It is only a few years ago, but a very few years ago, as time is measured even in a man's lifetime, that the Chicago Edison Company spent a very large sum of money in building a generating station on the Chicago River at the corner of Harrison Street, known to most of you as the Harrison Street Station. That station served its purpose, produced energy supposedly about as cheap as it could be produced at that time. Today that station is so little a factor in our business that I am free to say that I do not know whether it operates one month in the year or six months, and I think some years it does not operate at all. There is a property that cost a million and a half to two million dollars, and has a little less than half the capacity of the last turbo-electric generator unit that we ordered for one of our modern stations. That about tells the story of the generating side of the business.

The ability to mass enormous production, to do it at an economy of cost so far as investment and operating is concerned, and the permanency of building and installation which it is impossible to attain with smaller enterprises, has brought us to a position where, anywhere this side of the Missouri River where coal is reasonably cheap, energy can be produced at such low cost—it is not necessary to go into the figures here—that it enables us to build an expensive distribution system and sell that energy at low cost not only in very large centers of population, but in the smaller towns and villages wherever the density of population justifies the expenditure on the distribution system.

What has led us, so to speak, to desert the electric lighting business and go further afield and turn our companies into power companies, energy producing companies, to sell that energy for whatever uses the user may desire to put it to? Fundamentally it is the low load factor of the lighting business. The load factor of lighting of any city in this latitude is, on the average, about the poorest business that it is possible for an electric light company to have. I would not have dared to make that statement

ten or twelve years ago if I had known it—I don't think I did know it at that time. I was trying to persuade myself then that the lighting business was a very good business to have. Today I believe in taking it because it is one of the obligations that we have incurred and that, when taken in connection with other lines of business, can be made profitable; but take it by itself, it is as poor a branch of business as any we take on our system.

I think that is probably well illustrated by making a comparison between the figures of upwards of three hundred of the electric supply companies in Great Britain, and the figures of the Commonwealth Edison Company. We took the actual population of Chicago, 2,185,283 in 1912, or to express it in round figures we call it from two and a quarter millions to two and a half millions, and we compared that with the population of Great Britain in 1911 and 1912, of about 24,250,000. We compared the Commonwealth Edison Company's business, in these figures that I am going to give you, with the combined businesses of 303 electric supply undertakings. Their plant capacity is 961,000 kilowatts; our plant capacity at the same time was 264,000 kilowatts. Their output was 1,128,000,000 kilowatt hours, our output was 712,000,000 kilowatt hours. Their income was a little over $40,000,000, ours a little over $15,000,000. Their investment was $310,000,000, ours was $68,000,000. With approximately one and a half times our output, their investment was pretty nearly five times ours. Their business is very largely lighting business, our business is a general business, but mainly power business. Now take the investment per capita as a test. They have an investment per capita of $12.78, we have an investment per capita of $31.24; but their kilowatt hours sold per capita is 46½ and our kilowatt hours sold per capita is 326. In other words, we sell seven times more kilowatt hours per capita than they do. Their income is $1.67 per capita and our income is $7.03. We have more than four times as much income per capita as they have. Their price, incidentally, is about 70 to 80 per cent higher than ours, notwithstanding the fact that we have expensive labor and they have

cheap labor. They necessarily have cheaper money than we have and I think lower taxes.

Now, these figures about illustrate the difference between a general business and a lighting business. I have not any very good information on their load factor, because they figure load factors rather differently from what we do. They figure load factor on the ratio of the average kilowatt sold, to the maximum kilowatt capacity of their plant, and their load factor shows about 20 per cent. Our load factor shows 35 per cent on their basis of figuring. On the American basis I presume their load factor would show about 25 to 26 per cent and our load factor would show about 42 to 45 per cent. That, I think, explains the story, and gives you about the difference between an operating company run for lighting purposes and an operating company run to supply energy for every purpose.

Now, as to what combination of production and distribution means. Take the average large company, if they do just an ordinary lighting and an ordinary retail power business, their load factor is about 30 per cent. If they do a general business, quoting such rates as will give them a very large output of energy for manufacturing purposes, for transportation purposes, and for lighting purposes, their load factor will run about 45 per cent, or, in other words, their investment will average to be in use 50 per cent more time than that of the company which runs its business on the basis of dealing in ordinary retail light and power. Increased load factor means a relative decrease in interest charge and almost a relative decrease in depreciation charge. The labor items are not of such serious consequence, although it would mean a partially relative decrease in labor charge, as labor is not in proportion to load factor.

What are the obstacles to producing a general system of generation and distribution as such figures would seem to make desirable? The most serious obstacle, I think, is the question of the engineer. One gentleman explained it to me this morning as the engineer's caution. I corrected him and told him I thought it was the engineer's prejudice. I think that is the most serious

obstacle we have to deal with. To a lesser degree and dealing with the lower grade of engineers, we have the same prejudice to deal with where we try to do away with isolated plants that are in our midst. I would add to the obstacle of the engineer's prejudice another item—and I must ask those engineers who are in this room who are on that side of the business to excuse me for mentioning it—and that is the so-called self-interest of the consulting engineer. It can not be the interest of the investor whom the engineer is supposed to advise, because it is easy of demonstration as to which is the most economical course for that investor to pursue. Such conditions have grown up over a period of years. People are unconscious of losing any money and therefore they are perfectly willing to continue to lose money. But take the large energy using enterprises of the country. It does not seem reasonable to suppose that the bankers who have provided the money would take the position that they do not want that money spent in the most economical way possible; that does not seem a reasonable proposition. It is easy of demonstration in any considerable amount of territory which carries over its area a considerable population that the economical course is to produce energy in large quantities; that is as simple a manufacturing proposition as producing lamps in large quantities, and to distribute that energy over as large an area as can be economically operated from one center.

This is capable of demonstration not only from the point of view of the large cities but from the point of view of small communities. Take for instance the figures of the northern end of Illinois, with which I am personally very familiar, not only statistically but with the territory, because I live in it. Several years ago there were isolated central station plants operated separately with load factors by themselves of thirteen, fourteen and fifteen per cent. Assuming the value of those particular plants, just the generating stations by themselves, at $175 to $180 a kilowatt, I can show you in that same territory that after building substations and transmission lines and increasing the investment per kilowatt over twice, that owing to the changed conditions, the

permanency of the service, the low cost of the energy and the resulting increased power business, the load factor improved so that today it is practically 28 to 30 per cent, the operating cost, including interest and depreciation, only two and a half times increased, the investment which you have to make to get substations and transmission lines into use is taken care of, and the business, from being just a little shoestring business which no one would care to give any particular attention to, grows to formidable proportions, is easily financed, and is put on a basis that is a credit alike to the owners and the users and a great benefit to the territory that is served.

This same territory and northern part of Illinois is mentioned because I am familiar with it. I will show you if you extend it a little farther and take in the larger towns in the territory, if you go still farther south and embrace a large portion of the state, where they use energy for general transmission purposes, interurban roads, for pumping water to drain the land in one place to irrigate it in another place, for moving machines to produce the coal underground and the manufactured articles on the surface, a situation is produced where you have a load factor, owing to the enormous diversity of the various businesses using the power, as large as you can get in any large city in this country.

These are not theoretical figures, gentlemen, they are not theoretical conclusions. I am responsible for probably $250,000,000 invested in the business which is operated broadly on the policy that I have been trying to enunciate to you today. It is not a policy that is peculiarly my own. Strange to say, it is a scheme that has been worked out rather from the bottom than from the top. The week before last I travelled about 1,200 miles by automobile through New Hampshire and Vermont, and I was surprised to see the number of small transmission systems operating through that territory. I was very much surprised to see to what an extent all the energy in a given territory is produced from one source. I had thought that we were doing more of this class of central station work in the central west and especially in the far west where they have such large water-powers, and I was very

agreeably surprised to see how much of it is being done in the old-fashioned east. I see no reason why the prejudice of an engineer who desires to have the largest possible units in his company's generating station, should stand in the way of economical operation of the properties under his control. I see no reason why you should have a transmission system twenty or thirty feet above the ground, another one on the ground and another one twenty or thirty feet under the ground, and still a fourth one running parallel with that, each operating separately as is the case in New York. We fortunately live in a country where we have not reached the point of saturation, and where the possibilities of our business are tremendous. There is not any great difference between our business and the transportation proposition. You take any large city of the United States, and every new scheme of urban transportation that is laid out is practically filled and overflowing before it hardly comes into use. Now, it is the same with our business—before we can possibly build a generating station we have the customers to absorb the energy that that station produces. A unification of the power generation and distribution in the large cities and in the country districts, especially in the manufacturing country districts, would have the effect of releasing a very large amount of capital temporarily; I do not mean to say that it is capital that would go into the bank, it would be very largely in the shape of copper. It would take but a few years for that to be absorbed by increased uses, and the service could be given cheaper, or, if it is cheap enough now and there is not a sufficient return being obtained on the investment, a greater return could be obtained from the investment.

I am expected to say something about the future of the distribution of energy. It is a little dangerous to prognosticate as to what is likely to happen. I am absolutely positive that the necessity for the conservation of the fuel resources of this country will force the concentration of the production of energy. Tomorrow Mr. Vanderlip is going to talk to you on the financial outlook, and I presume he will have something to say of the enormous sums of money required by the electrical business to properly finance it.

I think when you have listened to the figures which he must necessarily use, you will come to the conclusion that the economical financing of this great business in the future will force the concentration of the production and distribution of energy over such areas of our country as have great density of population.

It looks to me as if we are approaching an era when the business of producing and distributing energy will come into its own. You all know the vivifying effect on business of a given territory from the development of first class transportation systems. Picture to yourself what must take place in the country, certainly east of the Mississippi River, from the development of general systems of energy distribution. To my mind this territory will be a network of lines for transporting electrical energy. And when that time comes, energy will be purchased as energy, it will be used for whatever purposes it may be required, such as in transportation, in the homes of our people, and in our manufacturing establishments. Our great trunk lines of transportation, certainly within fifty or sixty miles of their termini, will be purchasing that power to operate their trains. Electric energy will perform the same functions for the whole community, whether in the great cities or in the hamlets and villages, that the small water-powers of New England perform for the small communities in which those water-powers were established.

There is another side of all this matter that it is well to consider. While I suppose most of us engaged in this business are fascinated by its constructive possibilities, after one reaches a certain point one likes to feel that besides doing one's duty to one's associates and to those who entrust him with their money, he likes to feel that he is contributing something to the progress of the country in which he lives and of the people among whom he lives. I think it is a great privilege to us in this business—of course I naturally say especially to us on the operating side of it—that we are engaged in a business that has such great possibilities, not only of results to ourselves and our stockholders but in the great advantages that this business is capable of bringing to the people of this country and the great part it must take in the future

in the solution of some of the great industrial problems with which this country is confronted. Providing that labor can be secured, I do not think it is at all a wild statement to say that in a relatively few years there will be very few parts, certainly of the eastern states and the central western states, where energy can not be bought at such prices as will enable a manufacturer to operate his plant economically, either in the smallest community or in the largest center of population. It is to that point I am trying to work wherever I am operating, more especially in the great State of Illinois, which has been so kind to me for the last quarter of a century. My main reason for coming here is not to give you any new message, but to try to bring home to you the truths that come to me every day when I am running my business at home, namely, that there is only one possible way to develop this business to great permanent success and that is on a basis of low cost of production, a minimum cost of distribution and a minimum selling price to the community.

Following Mr. Insull's address, Mr. F. S. Terry of the National Lamp Works offered as a resolution, that the following telegram be sent to Mr. Morrison who, on account of illness, was unable to be present at the meeting.

"Camp Co-operation, at its first session today, sends you sincere regrets that illness prevents you from being present, and expresses the hope that this will find you better and very soon in the best of health."

The Chairman then read telegrams from Hon. Theodore Roosevelt; Thomas M. Peters, President Southwestern Section of the National Electric Light Association; D. R. Sweet, President of the Canadian Electrical Association; Fred Nicholas, President Canadian General Electric Company; and General Geo. H. Harries.

HON. WILLARD HOWLAND

GOVERNMENT IN RELATION TO BUSINESS

By Hon. Willard Howland

MR. PRESIDENT AND GENTLEMEN, I fear I may enforce upon you the sense of misfortune occasioned by the fact that the gentleman to whom my subject was assigned is not present. I had no notice that I should address you, for it is only this morning that I was requested by our master of ceremonies to take Mr. McHugh's place. I may, therefore, present to you thoughts which are common to us all concerning the subject assigned me.

The interference, perhaps some might call it, of government with business, is perhaps a manifestation of the fact that it is through government that we obtain the privileges which we enjoy. Its purpose is to secure orderly liberty. We only feel the pressure of government when it opposes our will. The government will be what we as a people make it, and I urge upon you this thought that government is a great organization dealing with vast interests and enterprises in which we are both stockholders and directors. I believe it to be unfortunately true that the great minds of this country, leaders in its business life, pay too slight attention to the affairs of the government it is their duty to conserve and preserve. I have had the fortune to be for six years a member of the legislative body of Massachusetts, and I have had opportunity to observe the operations in their beginnings, the legislative tendencies of the times and in the politics of the people, and to see how, too often, the merit and value of the public servant as a legislator is measured by the constituent, by the length of his reach into the public treasury without regard to the general welfare. The government should secure to us the freedom of equal right to the pursuit of happiness. The Declaration of Independence speaks of seeking and securing the happiness of the people as an

end and aim of government—leaving free to the individual, as far as may be, without restraint, save for the common good, the accomplishment of the ambition to acquire. And that ambition takes the form of a desire to accomplish something not hitherto done—invention. It is to secure to the people something they have not before had.

The first act, I believe, of the Congress, was an act to promote and foster American industry. Following that comes the protective legislation to the ideas of men, our patent laws, and the striving has been that we might create something new, and just in proportion as the use of that new thing becomes universal, it becomes a necessity of the people. The luxury of the generation that has preceded us is the necessity of the present, and out of that necessity comes the idea of public regulation and of public ownership. I remember my grandfather, leaning over the front fence of his neighbor Joel, said, "Build it, Joel,"—he was building a barn—"so that it will last a hundred years, for the rising generation will never be able to put roofs over their heads." He had a poor opinion of his children. My father was one of them, but my father had a better roof over his head than the old gentleman ever had, and I think I have got a little ahead of my father, in that particular. What the old gentleman could not have bought for money is at the command of the humblest mechanic of our day. As I said, it is when the idea of something new and useful comes to the mind of one man, that the beginning of luxury is, and of the necessity that is to be.

Now, many of us view with alarm the idea of public ownership. I believe there is nothing to fear from the approach of public ownership, except where greed dominates and fails to furnish to the public the necessity which inventive genius has brought to them. Give to us—and I believe that every man here will recognize something of the truth of this—give to us the spirit which is manifest in the electrical department of industry today, the idea of giving to the public the best, at a fair remuneration for the capital employed, that is the best defense against public ownership, and the dangers that we fear because of it.

Regulation comes in that period which stands between the time when the article created is a luxury, and the time when it becomes a necessity. It is authorized by the police power of the state, which for the purposes of obtaining safety to the health and morals of the people, claims the right, and has it, of intervening in the private affairs of every citizen for the public good. Hence we find the factory of the individual inspected, in order that his employees may labor under conditions safe for them and therefore safe for the public, that public health may be improved, if you will, by reason of that employment, certainly not injured because of it; that public morals may not be harmed through the conditions of that employment. And so we as a people, manifested through our laws, are striving for the best there is in industry. We find the same thing also in the laws of those states that are seeking some way of ameliorating the conditions which exist between the employer and the employee, on the one side induced by his desire to acquire, and on the other side induced by the same desire, differing doubtless in degree. How shall we deal with those who labor in the productive industries of our country, and see to it that they receive a fair remuneration, that capital employed receives its fair remuneration, that the whole may work together to a higher and better civilization than our country has yet known?

Our standard of living is doubtless higher than any other. Practically all of the manufacturing states now have laws that in some form deal with the relations of capital and labor. It has been my privilege for the last ten years to be chairman of the State Board of Conciliation and Arbitration in Massachusetts, and I know something of the strivings of the people on both sides, the employer and employees, to accomplish justice as between the parties. The man who gives his superintendence to a business has as much right to a fair consideration as the man who works with his hands. These facts are being recognized. And in the trade agreements made the state recognizes that it is one of its activities to endeavor to prevent and to adjust difficulties between the employer and the employee. One of the provisions

of our law is that when a majority of these persons employed in an industry in which twenty-five or more are engaged, make application to that board for an examination of the conditions under which the labor is performed, they have a right to that examination. It is not usually employed, but strikes are not more frequent with us than with others, and are dealt with very largely by manufacturer and workman sitting down together and agreeing upon what is fair, a principle, I think, that all manufacturers and all workmen may wisely take to mind, and endeavor, so far as it is possible, to harmonize these two conflicting ambitions to acquire, which are the mainspring of every human effort.

All of our laws dealing with our manufacturing industries are made from the standpoint of the common people as to what is right. Public ownership has no terrors where both parties are willing to be just. The great development which the gentleman who has preceded me has spoken of, in relation to his industry, I believe finds largely its basis upon the just distribution of the contribution which each makes to the accomplishment of the general success. In our Commonwealth there was a law which took effect yesterday, the principle of which is that we withdraw from productive industry the children, and pay to those dependent upon that child labor the money the child would earn. That is going a long way toward paternalism. How far it will work out to the accomplishment of right is a problem. But the fact is that we are striving to a higher and better civilization, and what is common with us is common, I think, everywhere in the United States. We are seeking to elevate the condition of those who, with the employer class, are creating the advantages that we enjoy in common.

As I have said, the luxury of the last generation is the necessity of this, and the price of it all is labor. It may be the labor of the brain, it may be the labor of the hand, but in its last analysis it is labor. The complaint is of the high cost of living, but I submit to you the thought that for the things we have we expend no more labor than did those who had less than we in the generation preceding us. It seems to me this is a generation in which, on the

whole, laws are enacted which work wisely; but the price of non-interference, the prevention of interference that would work harm to the industry, lies in the interest and intelligence of such men as you, in the molding of public opinion, the creation of legislation which shall be at once a help and protection to the industrial interests of this great country.

The Chairman, Mr. McCall, then opened the meeting for discussion upon either of the two last subjects presented. Dr. Chas. P. Steinmetz was the first to respond:

Mr. Chairman, there is one point in Mr. Insull's paper where I do not quite agree with him, that is, in his explanation of the origin of the huge generating system which he has described. He states that it was the development of the large, efficient steam turbine alternator, of the modern converter and power transformer. While, as connected to some extent with the design of this apparatus, I appreciate the compliment, I believe Mr. Insull has been too modest. It was not the development of this apparatus which led to this big generative system, but, as I look at it, when economic laws made these big generating systems necessary, then the modern steam turbine alternator, the converter and the power transformer, were developed by the manufacturer as a matter of course. But the origin was those economic laws. And I believe you all appreciate, as I do, that to Mr. Insull belongs the credit of being the first man who has realized and appreciated the economic laws, not only theoretically, but who also had the courage of his conviction to carry out what he saw to be a necessary development of the electrical industry in building these huge stations, starting their construction at a time when really the modern turbo-alternator and transformer and converter were largely in the idea of the designer but not yet a reality. So I believe the credit of this development belongs to Mr. Insull more than to any other living man.

Dr. Thomas Darlington then arose for discussion of Hon. Willard Howland's address:

Mr. Chairman, it seems hardly necessary to add anything to what the able senator from Massachusetts has said in his address. I think he struck the keynote of the need of the hour, and that is that every man should take some interest in the political situation, and should belong to some party. A good citizen should regard it as a duty to attend primary meetings, to vote on election day and to take an active interest in government. Otherwise he has no right to criticize what the government does. If all the men, such as those in this room, would take an interest in governmental affairs, we would have little to criticize in the government. In this I practise what I preach. It is a high privilege to participate in the government of this great republic. And in this as in other relations, privilege implies responsibility and duty. Every impulse of patriotism is to make full and complete response to duty.

ELBERT HUBBARD

CO-OPERATION

By Elbert Hubbard

GENTLEMEN, it is a great pleasure to be with you here and to have the honor of speaking to you for a few moments. I say this for two reasons: one is because you expect me to say it, because you will feel badly if I do not say it, and the other is because it is true.

Not long ago I visited the State Hospital at Utica, New York, and while walking across the grounds, perhaps half a mile from the main buildings, I met an attendant with twenty-five patients. He was leading these patients out for a walk, and, incidentally, if possible, to get them to do a little good, old-fashioned work on the farm.

The attendant was a little man, and when I saw him in charge of these people, I said to him: "I do not want your job. What is to hinder a lot of these fellows from getting together and setting up a job on you? Supposing half a dozen of them jumped on to you all at once, what could you do?"

And the attendant looked at me with a steady gaze and said: "Oh, you belong here all right; otherwise you would n't ask that question. Don't you know that if these fellows could get together, they would n't be here?"

The badge of sanity is the ability to co-operate. The more people you can work with and for, the bigger and better are you.

I want to refer very briefly, in that connection, to a great executive who is no longer with us. I refer to the late Julius Cæsar.

Plutarch tells of two men in the employ of Julius Cæsar coming to him, and one of them saying to J. Cæsar this—there is nothing new under the sun—one of these men said, pointing to the other, "Colonel Cæsar, if you keep him I won't stay."

And Cæsar interviewed the other man and he was of a like opinion, and so Cæsar wrote on the back of an envelope a little message, and handed it to the first man and said, " You take this over to Sacketts Harbor, will you? " The man said " Yes."

Cæsar said, " Run, now."

The fellow started to run, and then said Cæsar to the other fellow, " You chase him."

" If you keep him I won't stay." That is quite like the fellow who says, " I was n't hired for that," and these are the men that the world can do without. But you can't do without the man who has the ability to forego his grouch ; and the smaller your think-tank the bigger grouch it can hold. I notice the little man with a peeve has always got a lot of uric acid in his ego. But the big man is the man who is able to forget it and meet other men on the basis of co-operation. There are three precious jewels in business that are being recognized as never before in all history, and these jewels are Co-operation, Mutuality, Reciprocity—you help me and I will help you ; we will not be here very long ; soon Death, the kind old nurse, will come and rock us all to sleep, so let us help one another while we may.

Now, I want to refer again, very briefly, to Julius Cæsar. I want to just call your attention to two or three things in the life of this wonderful man. A country boy, going up to the city and getting a job—which is just as good as accepting a situation—becomes a clerk, a bookkeeper, a secretary, then he becomes a priest, then he becomes Pontifex Maximus at thirty-eight, and then, not being able to get a man to do a job of work that he has laid out, he took charge of it himself. He tucked his pontifical robe into his belt, and led his armies to successful victory.

In eighteen years he conquered the world, or all he could find of it, and then he died, aged fifty-six, of compulsory vaccination.

We have the following story on the word of Plutarch, and all we know of that far-off time, practically, is what Plutarch tells us. It is a wonderfully encouraging thing that of the contemporaries of Plutarch, not one mentions Plutarch, and yet Plutarch is the only man of that far-off day that is read, and all we know,

practically, of " the glory that was Greece and the grandeur that was Rome," is what Plutarch, the farmer, tells us.

I am going to tell this story to you and then I am done. Cæsar was a maker of roads; he was the maker of our calendar; we must remember him for another thing—he was the man that devised the corporation, a body without death and a mind without decline, founded on the idea of the invincible Tenth Legion, a band of soldiers that never died. The individuals dropped, they might go down in battle, but at night, when its men camped, other men were put in, and so, " The Tenth Legion always lives " was the slogan of Rome. And on this idea this man built roads, built aqueducts, and fortifications. He would appoint one hundred men to do the job, giving his orders that when one man died they should appoint his successor, and the job would take longer to complete than the life of any one of the men there. Lord Coke said that the corporation was the greatest idea ever conceived by human mind. The English people took up the idea only a little over one hundred years ago—one hundred and fifty years ago—and we had the stock company, the idea of Julius Cæsar, without a single patentable improvement, the body without death, the mind without decline.

Well, here is the story. Cæsar, the road-maker, riding along a country road, sees ahead of him a country bumpkin, a villager, sitting on a Rocky Mountain canary, with panniers on either side, going to market, carrying a load of produce. This fellow gets crossways on the road—this man knows Cæsar, because a villager knows everything. He is the one man who has always got his nerve with him—this man knows Cæsar, but, of course, Cæsar does not know him—he was n't anybody any way, but he was big enough to block the road—a man does not have to be very big to block the road. " One sinner doeth much harm," says the Bible.

But here is this countryman blocking the road. A man does not have to have much influence to block the road. I was in a theater once where a man yelled " Fire ! " He was not a man of prominence, he did not have very much influence, and yet he exerted an influence on everybody in that theater, I noticed. But, forget him.

But here is this fellow blocking the road, sitting on his Rocky Mountain canary, and Cæsar, the man who conquered the world, comes riding along. Cæsar is always gentle, always kind, as a man can afford to be who has power plus. Cæsar quarreled with nobody excepting on a very big issue. So he was amused to see this man blocking the road, and he reined in and he said, " My friend, what is your name, and what is the name of your ass? " And the man said, " My name is Fearless, and my ass is Victory."

Cæsar flipped him a Canadian half dollar and said, " Well done."

But shortly after this, on the prow of every Roman galley there was carved an ass's head, and above this, on a little flag flying in the breeze, was the word " Victory."

Cæsar was just a little bit superstitious. We have a good deal to learn from that man—the idea of holding your temper, no matter what happens, smile, even when they block the road, forget and pass on. We have a good deal to learn from that man ; some day we will catch up with him.

But in the meantime we don't want to forget, that when the world is conquered, it will not be conquered by the forces of violence. It will be conquered by the forces of Reciprocity, Mutuality, Co-operation, by the forces of Creation, Production, and Distribution. The strongest countries in the world now are not those which can destroy most, no more than the strongest men in the world are those who can kill most. The strong men in the world now are the men who can confer the greatest benefits, who can best serve society, who helped themselves by helping other people. We are public servants, we help ourselves by helping humanity. We believe in the hands that help, in the brains that think, and in the hearts that love.

On Thursday evening Mr. McCall called on Dr. Charles P. Steinmetz to take the first place on the program.

DR. CHARLES P. STEINMETZ

THE FUTURE TECHNICAL DEVELOPMENT OF THE ELECTRICAL BUSINESS

DR. CHAS. P. STEINMETZ

GENTLEMEN, the subject on which I have been asked to speak is, "The Future Technical Development of the Electrical Business." To estimate the future development of an industry, the most promising procedure appears to be to consider the trend of present progress, and from that judge what will be the future development; and if we can find and show that the tendencies displayed by the present development are not incidental or accidental, but are the result of economic laws, then we can, with reasonable probability, predict the future development, as the same economic laws must continue to act. For there is this difference between economic laws and political laws, that economic laws are laws of nature, not made or rescinded by enactment, but are an expression of the relation between cause and effect, and the same cause will bring about the same effect in any given case.

In the development of electrical generating machinery, we have reached in steam turbine alternators sizes of 40,000 horse-power, and find that the economic efficiency of the apparatus is still increasing with increasing size, so that we can predict that still larger sizes will be built when the demand arises, and the size of the machinery is merely an economic question of the system in which the machine is operated: the question of the size and number of units is dependent on the size of the system, and as the present trend, based on economic laws, is towards larger electric generating systems, we may predict that larger and larger units of generation will be employed.

In long distance transmission, voltages of 140,000 are being

successfully employed, transmitting energy over distances of hundreds of miles. All over the country we see high potential transmission lines being interlinked with each other, connected together into systems and networks of transmission lines, supplying with energy larger and larger territory. There are now energy supply systems in operation, covering territories of 10,000 to 20,000 square miles and more.

In electric lighting the present MAZDA lamp gives more than five times as much light for the same power as Edison's early carbon filament lamp gave. In the not far distant future we may once more double the amount of light given by the same power, and still higher efficiencies are reached in some of the modern arcs. In locomotion by electrical energy, steam railway lines have not been electrified as yet, with the exception of a few cases where special conditions existed, such as tunnel operation, mountain railways, and so forth. But aside from and outside of the steam railway system of the country, another system, an electric railway system, has been built up, paralleling and supplementing the steam railway system, and has increased to such a magnitude that the amount of power consumed by the electric railways of the country, the city lines, the rapid transit lines, the suburban and interurban systems, is probably as large, if not larger than the amount of power which all the steam railways take. When we see the mighty electric locomotive carrying at high speed a heavy railroad train, we are impressed with it, but we are not impressed when we see the every-day trolley car passing by us; we don't realize, because familiarity breeds contempt, that this insignificant trolley car is really bringing about, and has brought about a social revolution in modern life difficult to realize, a revolution which the dweller in the big city does not realize, but which you realize when you look over the country and its industries.

What the electric railway does and has done is to take away the population from the cities and bring them back again to the country. The problem which our socialists have been helpless to solve, the crowding of the people into the cities and the depopulation of the country, with the resulting deterioration of the nation,

is solving itself before our eyes by the work of the trolley car, which brings the city dweller back to the country, by making the country available for his residence, and which makes the superior working conditions of the city available to the country dweller without his leaving the country. The trolley car has taken the industries away from the crowded cities to the country town. Industrial cities, like Schenectady, could not exist without the trolley lines. It would not be possible to have an industry employing 20,000 skilled men, exist in a country town without the electric railway as means of quick and cheap transportation, so that the population can cover a sufficient territory to get decent living conditions. Without the trolley car it would mean to supply the employees of the factory from a population crowded together in a small territory, within walking distance, in crowded tenements, with the resultant degeneration and deterioration of the conditions of living, and with the resultant change in the character of the working population. Instead of a law-abiding American city, we would have an industrial town of the character that has become notorious in the past few years by outbreaks which might almost be called local civil war. This improvement, from a factory town to an industrial city, the trolley car is bringing about.

New industries have arisen in electro-chemistry, electro-metallurgy, making possible things that have not been done before, supplying us with materials never before available, such as aluminum, carbides, nitrides, and so forth.

In the field of the domestic use of electrical energy, cooking devices, heating devices, domestic motors such as the fan motor and other devices have developed.

I have n't yet mentioned the application of the electric motor to the industries of the country, because even to roughly outline this field of industrial power application would require more than the whole time available for my address.

However, it is not the subject of the development of the electrical engineering industry which I desire to discuss, but the subject of the technical development of the electrical business.

To judge of the changes which must be brought about in the

industrial and the transportation business of the country by the development of electrical engineering, you must first consider the characteristics of electrical energy, to see what results may be expected from the particular characteristics of this form of energy.

Electrical energy has three prominent advantages by which it is superior to all other forms of energy, but it has one very serious disadvantage which dominates the character of electrical applications.

Electrical energy can be economically transmitted over practically any distance. Mechanical energy, for instance, by a rope or belt, can be carried only a very limited distance. By compressed air, it can be carried a moderate distance, but not very far. In contradistinction therefrom, we can send electric energy economically, with moderate loss, over hundreds of miles. The only form of energy which is equally advantageous as regards long distance transmission, which can be sent over just as long or even longer distances than electric energy, is the chemical energy of fuel.

All modern development of industry, domestic and social life is based and depends on the separation of the consumption of energy from the production of energy. Those places at which energy is required in large bulk, the large cities, the large industries of the country, are not the places where energy is found in nature, not the places at the mouth of the coal mine or in the rocky gorge where water power is available. The coal mine and water power are rarely placed where economical use can be made of the energy, where a city can be built or an industry located. Consequently all modern industries have to rely largely on the transmission of energy from the place of its derivation to the place of use. There are only these two forms of energy, the chemical energy of fuel and the electrical energy, which can be transmitted economically, and only these two come into competition.

Whenever you consider the economical transmission of electrical energy, the question is, can electric power be delivered at the end of the transmission line as cheaply as power can be produced there

by steam? That means, in other words, as cheaply as the energy can be transported there in the form of coal by the freight car or the canal boat and converted into the different forms of energy as desired. You see the problem always is the competition between the sending of the energy to the place of consumption as electricity, or as chemical energy of fuel. The conclusion is that sometimes one and sometimes the other is more economical.

As regards the ease and efficiency of transmitting or transporting energy, electric energy is as desirable and about as economical as the chemical energy of fuel. Over the latter, however, electrical energy has the enormous advantage of the ease of economical conversion into any other form of energy and on any scale; and it is in the latter aspect that the chemical energy of fuel fails, because the chemical energy of fuel can not be well converted economically into other forms of energy; it can be done economically only in large bulk. It means the steam engine with its auxiliaries, the steam boiler, the engineer, the fireman, and so forth. It means a very low efficiency except in very large units of thousands of horse power. On the other hand, with electrical energy the opening or closing of a switch starts or stops the motor, whether it be the fan motor which you have in your home or at your office, or a 1000 horse power motor. Now imagine a little steam engine driving your fan motor with boiler and coal furnace to be fired when you wish to start your desk fan. You see how impossible economically this would be. Pressing the button starts the conversion of electric energy into light or heat. The chemical energy of coal would require a complex plant, producing and then distributing gas, or it would mean a special form of chemical energy, the energy of oil in the kerosene lamp, etc. So you see that in the ease of conversion to almost any other form of energy, the electrical energy is vastly superior to the only other form of energy that can be supplied at a distance, the chemical energy of fuel. The electrical energy is vastly more easily converted, and the energy of coal seems useful only where a large bulk of energy is needed in concentrated form.

This feature of easy convertibility has really given electrical

energy its predominant position in power transmission and distribution.

The third prominent characteristic of electrical energy is the possibility of very high concentration of energy. You can concentrate electrical energy far more than any other form of energy, and therefore can accomplish by means of electrical energy, things which you can not accomplish by other forms of energy. For instance, to separate iron from its ore, we can use the chemical energy of fuel, because with coal, in the hot air blast in the blast furnace, the iron separates from its ore. To separate aluminum from its ore we can not use the chemical energy of fuel, because this energy is not sufficient; it requires the higher concentration of energy given by electric power. So in aluminum reduction we depend on electric energy; while in iron reduction, where less energy is needed, we can get along with the chemical energy of fuel. When we reduce iron by coal from its ore, the iron takes up carbon, and forms a carbide, cast iron. But we can not make calcium carbide by the same method, by fuel, that is, by burning coal; it requires a higher concentration of energy than fuel can give. We again have to fall back on electric energy. Numerous other products have, like aluminum, become practically available only by electrical energy, as carbides, silicon, chromium, cyanimid and nitrate fertilizers, ozone, etc., etc. The high concentration of energy which electricity makes available, enables us to produce in a more economical and more direct manner, by what we may call the brute force of energy concentration, many things which heretofore had been produced only indirectly by a roundabout chemical process. We find electro-metallurgical industries using electric energy in the production of caustic alkali, chlorites, phosphorus, and so forth. Copper refining, iron smelting, all these operations can be done through fuel energy or other methods, but by electrical energy, we can do it directly and more economically with fewer incidental disturbing factors.

These then are the three advantages—the ease of transmission, the simplicity of conversion into other forms of energy, and the possibility of very high concentration.

Against this, however, stands as the one serious disadvantage of electrical energy, the fact that it can not be stored but must be consumed at the rate at which it is produced. We have, indeed, the so-called electric storage battery, but this does not really store electrical energy, but stores energy by converting it into chemical energy, which by the discharge is reconverted into electrical energy. It is economically very inefficient, and therefore does not come into consideration where we consider and deal with electrical energy in the energy supply of the industries. We would never think of the storage battery in considering the failure of the energy supply during the two or three months of the dry period of the water power, would never dream to store the electrical energy in a storage battery during the spring freshets and utilize it during the two or three dry months. That would be obviously impractical. So the electric storage battery comes into consideration only for special uses where economic efficiency in its broadest aspects is a secondary consideration, and we may dismiss it from consideration in the general problem of the world's energy supply, and say that the characteristic of electrical energy is that it can not be stored, and that, therefore, it must be used at the rate at which it is produced.

This makes the rate of consumption of electric energy dependent on the rate of production; it makes the economy of using electrical energy dependent on the economy of production. This is not the case with other forms of energy. For instance, the cost of coal is the same whether you use 300 tons in one day, and nothing during the remaining 29 days of the month, or whether you use coal uniformly throughout the month, at the rate of 10 tons per day. But it is entirely different with electrical energy. If you use ten horse power from an electric motor uniformly every day, that means that you have to provide ten horse power generating machinery, a capacity of ten horse power in the transmission system; but if we want to use three hundred horse power one day and nothing twenty-nine days, that requires three hundred horse power in generating capacity and the same in transmission. It means thirty times as much investment and a corresponding

increase of cost as represented by the fixed charges. So we see that the cost of electrical energy very largely depends on its rate of consumption, because this rate of consumption is related to the rate of production, and therefore to the economy of production.

This feature of storage difficulty we can perhaps illustrate by comparing the distribution of electricity in a large city with the distribution of gas. The gas works are in operation probably twenty-four hours a day, producing gas at a uniform rate, but storing it in the gas holders. Whether the daily gas consumption is spread uniformly over the twenty-four hours, or whether all the gas is consumed during one single hour of the day, makes very little difference in the cost of production, as it is produced in the same manner at a uniform rate throughout the day, the rate of production being practically independent of the rate of consumption. But if the electric power is consumed at a uniform rate throughout the day, that would mean a small generating plant and a steady load. If all the electric power is consumed within one hour of the day, it means a plant twenty-four times as large running one hour and standing idle the remaining twenty-three hours, so that you see the cost of electric energy would be many times greater if all the energy is used only during one hour and no use of it made during the remaining twenty-three hours, many times greater than if the same amount of energy were used uniformly distributed over the time.

This means that the cost of electrical energy is dependent not only on the amount of energy but essentially depends on the distribution, in time, of its use, on what is called the *load factor*, that is, the ratio of the average consumption to the maximum consumption, since the former, the average consumption, represents the total consumption of energy, but the maximum consumption represents the fixed cost. There is nothing analogous to the effect of the load factor of an electrical system, on determining the cost, in any other form of energy.

There is one rather curious and interesting feature of electrical energy. Electrical energy, as such, is really the most useless form of energy. It is not found in nature in useful quantities; there is

practically no use for electrical energy as such; where it is used, it is always used after being converted into some other form of energy, and is always produced by some other form of energy being converted into electrical energy. So you see electrical energy is always an intermediate form of energy, intermediate between some primary energy, mostly the chemical energy of coal, sometimes the hydraulic energy of the water power, intermediary between this energy which we find in nature and the energy of the form which we desire to use, mechanical motion, light or heat. Electrical energy therefore always is a transmission link. By far the largest amount of it is originated from the chemical energy of fuel, generated by steam power, in the steam engine, or steam turbine, sometimes the gas engine.

If we consider these two features, that electrical energy can not be stored but must be used at the rate at which it is produced, together with the feature that electrical energy is usually derived from steam energy, you see it follows that the economy of electrical energy consumption is the economy of the steam engine or steam turbine that produces the electrical energy, and to utilize electrical energy economically, it must be utilized in such manner that the energy is produced most economically from the steam plant. The steam plant as producer of energy increases in efficiency with increasing size. The 1000 horse power steam plant is very much more economical than the 10 horse power steam plant. The 100,000 horse power plant is still more economical than the 1000 horse power plant. That is, with the increasing size of the energy-generating plant, with the increasing size of the electrical transmission and distribution system, the economy of electrical production in the steam plant, and therefore the economy of electrical supply and consumption, increases steadily, with practically no limit. This is the economic law of the steam plant, economy increasing with increasing size, and this economic law is, without change, transferred, as the economic law of electric power generation and utilization. It means that economy of electrical power supply requires big systems, requires the concentration of generation, transmission and distribution into larger and larger systems.

It means that the small plant, supplying the city or village, can not compete economically with the substation on the transmission line of the big generating plant. It means that the smaller electrical system must be crushed or absorbed or consolidated with the large one.

This is the economic law which we see in operation all around us, everywhere. As Mr. Insull explained, you find it in Illinois in the big city center, and you find it in the near wilderness of New Hampshire, and everywhere you find the same economic law, which means consolidation of electrical generating systems into bigger systems, inter-connection of transmission lines, formation of a network, state-wide, nation-wide. It is the same economic law which has, in the field of steam railways, led to their consolidation into great railway systems interlinked and co-operating with each other. You see the same effect following the economic law, of efficiency of power consolidation, taking place in the electrical business. In the last century a network of steam railways has been formed, consolidated, co-operated all over the country; so today a network of transmission lines is forming all over the country: the one, the steam railways, taking care of the transmission and distribution of freight and passengers; the other, the transmission lines, taking care of the transmission and distribution of energy. Necessity is the mother of association in industrial life.

Appreciating this, it must necessarily be of considerable advantage to see in which direction development must proceed in order to avoid the mistakes which have unavoidably been made, due to inexperience, in the consolidation of steam railways, and by the experience in the formation of the network of transportation lines which covers our country, to benefit in the formation of the network of energy-transporting lines or electrical transmission lines which is forming over the country. And the same laws, the same responsibilities, the same rights that the steam railway has, as the right of expropriation, certainly should exist for the network which transmits and distributes the energy required by the country; just as much for the energy distributing network as for the network which transmits and distributes the freight of the country;

This development is beginning to be pretty well understood, that we are advancing from the isolated electrical generation plant to the inter-related electrical supply system, of which big sections are already in existence, spreading rapidly until they come in contact with each other, and then interlinking into still larger systems.

The engineering problems that have to be worked out are being worked out, and many of the most important ones have been worked out in the Chicago system. The most important one of all of them is to limit the destructiveness of the energy concentration in such a system. You see when you inter-connect the energy transmitting and distributing systems of the country into one, energy being the capability of doing work, you have the inter-connected energy supply of the country available anywhere in the system, for doing work usefully or destructively. You deal with a destructive power, when beyond control, compared with which Niagara is insignificant. It means, therefore, that while retaining the transmissibility, the availability of energy anywhere, we must still limit it so that nowhere can energy accumulate destructively. This problem has been solved in the Chicago system, because that system reached a size greater than was safe, without control of the possible destructiveness of the energy. Now, with the power limiting devices, there is no possibility of any very destructive energy accumulation in this system any more. At the same time the energy is available anywhere in the system. I mention the Chicago system because there the problem has been met first and solved first. The same solution is now being applied everywhere, to have the energy transmission and distribution interlinked and inter-connected in big systems and still limit the possible destructiveness.

While this development of the transmission and distribution of energy in the form of electrical energy is fairly well outlined, and the progress is sufficiently advanced for us to be able to state or predict with reasonable certainty what will happen, with absolute certainty if we realize the economic laws which are forcing to development, much less satisfactory is the situation in

the utilization of electrical energy. In utilizing the electrical energy of our transmission systems there is still considerable misconception. There are especially two questions which are very often asked, and asked wrongfully. One is the question, whenever a problem arises, "Can this be done electrically?" Now, that question is wrong. It is not the question, can this be done electrically? It is not the question, for instance, can the trains of our trunk line railways be carried or pulled by electric locomotives, but the proper question is, can this be done by electricity more economically than it is done in some other manner? When asked the question, can the trains of our railways be pulled by electric locomotives, the answer obviously is, yes; but when you ask, can the trains now existing on the railways be pulled more economically by electric locomotives than by steam locomotives, the answer on many railways would be "no." It is a different question. Even in the strictly engineering field, that wrong question is often asked where different methods of carrying out an electrical problem are compared. We ask the question, "Can railways, cars and locomotives, be propelled by alternating current motors?" The question is answered by "yes," you can be shown that it is being done successfully. But where you propose a solution of a problem and say that can be done, and show that it is being done successfully, that does not mean that it should be done in this manner. The question is not, can cars be propelled by alternating current motors, but can they be propelled by alternating current motors more economically than by direct current motors. You see the fact that it is being done is no evidence that it is better than some other method. I don't wish to go into the specific question, but merely illustrate that the question: "Can it be done" in one manner and the proof that it is being done in this manner, is no evidence that this is really the most economical way. Thus, whenever a big transmission problem is being discussed amongst electrical engineers, quite often some electrical engineer proposes to transmit power by high voltage direct current, and proves that it can be done, and shows that there are a number of high voltage direct current systems in suc-

cessful operation, and tries to use this as proof that it should be done by high voltage direct current. That is no proof; that is not the question. Anybody knows that you can transmit electric energy by high voltage direct current, but the question is, can it be done in this manner more economically than by the alternating current. So you see we have always to realize that the question is not, "Can it be done electrically?" but, "Can it be done electrically more economically than in another manner?" And especially where the question comes, "Can it be done by one electrical method more economically than by another electrical method," there the man interested in electrical engineering, but not himself familiar with the details, is very liable to be misled by the statement that it can be done and is being done in one way. For instance, in an electrical system the question arises, "Can circuit breakers, transformers, lightning arresters and so forth, be installed out of doors?" Yes, they can, and are in many systems, but that does not mean that it is more economical to install them out of doors; it merely means that it can be done and they can be operated successfully; but the question is, "Is that method of operation better, more economical, than others?" In some cases it may be, and in others not. So that we must realize that the question is not an absolute, but a relative one—not, "Can this be done?" but, "Can this be done by the one method better than by another method?"

Another erroneous question that is often put is, "Can the steam engine be economically replaced by the electric motor?" When we discuss the application of electricity to an industry, we ask that question. That is a wrong question; the right question is, "Can this industry be operated more economically by electrical power than by steam power," really an entirely different matter. When we consider our present industrial operations, our present transportation system, we are always inclined to think that the present method of operation is the most economical one. And so it is; barring incidental cases in which it may not be so, it is the most economical one which is feasible with our present energy supply, steam power. But this method of operation is most economical

only if our power supply has certain characteristics, those of the steam engine. This method of operation, with a different power, with different characteristics, may be very uneconomical, and a very different operation, or the industry may often be far more economical with power having the characteristics of the electric motor.

We must realize that our whole industrial system is only relatively economical, under the conditions under which we operate, the nature of the power supply, and that with a different kind of power supply an entirely different organization might become more economical. And that means that from the point of view of economy, in the question of the introduction of electric power as the most economical form of power transmission and conversion, this change from steam to electric power is not a mere substitution of one motor for another motor, but is a problem of reorganization, a change in the method of operation from that suited to a previous form of power, to the new form of power. I can best illustrate this by the transportation problem. Our method of operating a steam railway is not inherently the most efficient, most economical method of operating a transportation system, but it is the most economical way of operating with the steam engine as a source of power. The characteristic of the steam engine, and thus of the steam locomotive, is that its efficiency increases with the size of the unit. Therefore, in our present railway operation the maximum efficiency is reached by using the maximum size of locomotive, the highest powered locomotive and the largest train, and thus the economic law of increase of efficiency with increase of the size of the engine unit, dominates of necessity our present railway system. It has led to the concentration into as large train units as possible, running at more or less infrequent intervals. It has made the steam locomotive grow to the maximum size which can find clearance under bridges and in tunnels, to the maximum lengths which can pass around existing curves, and so you see the whole development has been towards larger units so as to get higher economy.

If we consider the substitution of the electric locomotive, the

steam railway engineer is so familiar with the characteristics of the present power, the steam locomotive, that he as a rule does not realize that the present method of railway operation is based on the characteristics of the steam locomotive. So the problem is placed before the electrical engineer to replace the steam locomotive by an electric locomotive of the same size pulling the same infrequent, very large train units. The maximum economy of the electric motor, however, is the reverse; it is the subdivision or distribution of the load over time and over space. If in a hundred miles of road we have one single steam locomotive pulling one big train, that is much more economical than if we had ten locomotives each with only one-tenth of the power, carrying ten small trains. But if we had ten electric motor cars distributed over the one hundred miles of road bed, there would be much lower cost, much greater efficiency than with one great electric locomotive carrying one train of cars. If that load is distributed in ten or twenty units along the hundred miles of road bed, at every point you have only to supply the energy of one small unit. If it is concentrated into one big unit, your whole transmission system must be capable of delivering the full power at any one place. So you see the commanding requirement of electrical power is its division uniformly over the territory and over the time, the economy of the steam power is concentration in big units, and therefore you find the curious feature in many steam railways where the traffic is not very dense, if you compare the economy of the electric locomotive with that of the steam locomotive, you find there is no appreciable gain by substituting the electric locomotive in place of the steam locomotive, there may be even a loss of economy. At the same time an electric railway, a trolley line, with numerous motor cars, may be paralleling the steam railway, offering cheaper transportation, taking the traffic away from the steam railway, and prospering financially better than the steam railway. But the method of operation of the electric line is different, for it is based on the distribution of the load. Even the trailer hitched onto the electric car, which was used so largely in the early days, has almost disappeared. It is always a motor car, and where the

traffic is very dense, as in metropolitan cities, rapid trains are run, and they are trains of motor cars. So you see that the economy of electrical locomotion is in sub-division, distribution of the load over the road bed, while the economy of steam operation is the concentration of the load in as few units as possible. You see then that a mere substitution of one motor power for another one would not be the economic solution of the problem, no more than it has been in those bygone days when the steam engine came to replace the horse on the stage coach.

I can naturally only discuss the general problem. We all realize that in utilizing existing things, like existing railways, we can not always do what we would like to do, economically. It may be the most economical to run individual motor cars, but unfortunately we do not electrify all the railways of the country at once, and the Pullman car may have to go from the electrified zone into other territories. With the motor car you could n't economically do that. But I can not discuss the limitation due to existing conditions, which, after all, you meet in any problem.

The same condition applies to practically all industrial applications of the electric motor. It is hardly ever the question of a mere substitution. A mere substitution may increase efficiency, may be an advantage, but if the mere substitution of the electric motor for the steam engine increased economy, then the reorganization of that industry to adapt its operation to the maximum economic efficiency of the electric motor would naturally be still more economical. I have seen this development in the organization of the cotton industry, from the steam engine to the electric motor. There a prominent electrical engineer had practically made it his life work to study the problem and solve it. I refer to Mr. S. P. Payne, the pioneer in electrical operation of cotton mills. I remember in 1894 when the first electrical power transmission in the cotton mills of the south was introduced. The steam engine, driving the old mill, was replaced by one big synchronous motor, driving the same mass of shafting and countershafting and belting that was driven before. A new mill on the same system that was being opened did not have the big amount of shafting and belting,

but had hundred horse power induction motors, each driving a single line of shafting. Now even that has gone, and individual motors drive individual machinery and so realize the maximum economic efficiency of the electric power. You see with steam that is impossible. You could n't have a steam engine or a gas engine for every loom, but you can have an electric motor. And so you see the mill industry has moved from the New England states, and the steam engine, driving shafting and belting, to the Southern states, near the source of supply, the field of abundant cheap water power, to the individual motor drive. Here we have, in the relatively short time of twenty years, seen the reorganization of an industry which is more complex than many other industries, a rearrangement or reorganization to suit a different kind of power.

I wish to mention only one other feature in which the steam engine as a source of power in an industry differs from the electric motor. Whether a factory starts at eight in the morning and closes at six in the evening, or starts at six in the morning and closes at four in the evening, makes no difference in the cost of power with the steam engine. The economic operation of that steam engine, and thus the operation of that factory driven by that steam engine, is entirely independent of the time of work. But now suppose we have electric motors, buying their power from some control station or substation or smaller generating station. It makes a difference in the cost of power, whether I run from eight in the morning to six in the evening, or from six in the morning to four in the evening, where that power is supplied, for instance, from a station which supplied lighting. To illustrate, assuming I require five hundred horse power to operate the factory, I buy that from the local station, which possibly has a lighting load of a maximum of six hundred horse power. That lighting maximum is between five and eight o'clock in the evening. If I run my factory from eight A. M. to six P. M., it means that the station has to supply after five o'clock six hundred horse power in light and five hundred horse power in motors—eleven hundred horse power total; I have to supply a generating and transmission system to accommodate eleven hundred horse power. Suppose I change the operation of

my mill to run from six o'clock in the morning to four o'clock in the afternoon. At four o'clock when the power shuts down, there is practically no lighting load yet, possibly less than one hundred horse power, so I can carry the mill load of five hundred horse power, and the lighting load of six hundred horse power, with only six hundred horse power generating machinery, by merely arranging the time of operation to suit the economy conditions of electrical power so that it will not overlap with other demands. I have practically cut the generating machinery in two, from eleven hundred to six hundred horse power. If it is water power, I may have practically halved the cost of electrical power. So you see in electrical power the economy of its use depends on the relation of the character, the time and duration of all the uses of electric power in the system.

The relation between the steam engine as a source of power and the electric motor thus is about the same as the relation between the individualist and the socialist, using the terms in their broadest sense; the one is independent of everything else, is self-contained, the other, the electric motor, is dependent on every other user in the system. That means, to get best economy from the electric power, co-ordination of all the industries is necessary, and the electric power is probably today the most powerful force tending towards co-ordination, that is co-operation. To some extent this is rather curious, because when electric motors were first considered, very long ago, there was the hope expressed that the electric motor, by being able to supply small power economically, might reverse the industrial development which at that time was already tending toward concentration into bigger units, by enabling the small producer to compete with the big producer. But you see in its ultimate effect it is very much the reverse. The electric motor means co-operation. In the days of the steam engine, concentration of industrial operation was brought about by the economic law that production on a large scale is cheaper than production on a small scale; but by the introduction of electric energy we have a new economic force coming in with all the units of power so inter-dependent economically that they must co-op-

erate to get the maximum economy of power use, and that therefore even an entire industry can not economically operate independently of the other industries, but they must co-operate, correlate, so as to get the most economy from the available power supply system of the country, whether coal or hydraulic power is the ultimate source of the power.

The same law of reorganization for maximum economy applies in many other respects. I may only mention the effect on the industries of the economical utilization of hydraulic power. During a certain time of the year many rivers run dry and little power is available. To have uniform power throughout the year means an additional steam plant, greatly increasing the investment. If that industry could be reorganized so as to make it possible to use very little power during this short period of the year, it could get the economic use of the hydraulic power and this would greatly reduce the cost of the power to the industry. In many electro-chemical industries, for instance, this is entirely feasible. So even to get the most economical use of our water power means more or less reorganization of our industries. And that organization can not be brought about at once, can not be forced, for it is not a question of a year or two; but it is going on today, and it must be continued to get the maximum benefit in industrial economy from the energy available in our country by electrical transmission and distribution. The more we realize the necessity of this development, the more we understand the laws underlying it, the more we can assist it and the more we can avoid entering into development that is contrary to these laws, the more nearly we will escape failure and achieve success.

To review the whole matter which I desire to bring to your attention, electrical power is most economical and efficient in the transmission and distribution of energy, and therefore must take over the energy supply of the country. The fact that electrical energy can not be economically stored means that it must be consumed at the rate at which it is produced. It means that the economic law of energy production from steam power is the economic law of electric power use. It means that economy requires

co-operation, consolidation in a big, nation-wide, energy generation transmission and distribution system, analogous to our present railway system. All industrial operations depend for their economy on the form of energy used, and with the change of the energy used in the industry, the method of industrial operation requires a rearrangement, a reconstruction, to get the maximum economy of the new form of power. The introduction of electrical energy therefore, to get maximum economy, is not a mere question of substitution of one motor for another one, but involves a reorganization of the industry, and this reorganization, due to the nature of electrical energy, is in the direction of universal co-operation.

The chairman thanked Dr. Steinmetz, in the name of all present, for his interesting and instructive lecture; then introduced Mr. John H. Roemer, Chairman of the Railroad Commission of Wisconsin.

HON. JOHN C. ROEMER

STATE COMMISSION CONTROL

By John H. Roemer

THE necessity for intelligent regulation of all corporations and individuals rendering public utility services seems to be universally recognized. With the increase of population and the territorial expansion of our cities and villages, the importance of the public services are emphasized. Water, under pressure, gas, electricity, the telephone and the street railway are, at the present day, essential to the health, comfort and prosperity of the inhabitants of a modern municipality of any considerable size. Vast sums of money are invested in plants rendering these various municipal services. As such plants can neither be constructed nor operated except by virtue of a grant from the municipality or state, it is vital to both the owners of such plants and the public that the rights of each and the corresponding duties of the other in respect to the public functions of the public utility be clearly defined, and maintained in a spirit of fairness and justice to both parties. These obligations have generally been prescribed in the franchise granted by the municipalities as state agencies or by the state itself conferring upon the grantees the right to construct, maintain and operate such plants. But as the term of a franchise must of necessity be for a long period in order to induce capital to invest in the enterprise, experience has demonstrated that it has been impossible to satisfactorily fix terms and conditions of the franchise to meet unforeseen and unforeseeable exigencies which arise, in the progress of time, from many causes. No one can prophesy the changes in the arts embraced in public utility services, the developments and necessities of the communities served or the requirements of the utilities to perform their functions under changed conditions. In the last few years,

the enormous increase in cost of material and labor which enter into and become part of the cost of the service which the public utility is obliged to furnish is an element that has not always been counterbalanced by the economies resulting from new inventions and increased business, and unless the charges for the service could be increased in such event it would result, in case of the weaker utility, either in an impairment of the quality of the service or in financial embarrassment of the corporation or individual rendering the service. As an illustration of another burden that is often cast upon a utility and which may not be anticipated when the franchise is granted, we may refer to the advancement in the art of telephony which within a very few years has been little less than marvelous. Costly telephone equipments have been scrapped and entire systems reconstructed to meet the public requirement for the best service. The art of generating electric current has also advanced with such rapid strides that the expensive electric equipment of a few years ago is today found in the scrap pile, having no other value than that of junk. In other utilities the changes have not been so marked and equipment has become more or less standardized, but who can tell what a quarter of a century may bring forth in any art or science? Under the circumstances it is not at all strange that all attempts to rigidly prescribe in detail the obligations of the public utility to the public and vice versa during the life of a franchise have generally met with signal failure. To meet existing conditions, attempts have frequently been made to change the terms of the franchise. This has often resulted in engendering animosity between the public authorities and the management of public service corporations. The negotiations have not always been free from the suspicion that improper methods have been employed to induce those representing the public in the transactions to consent to terms and conditions detrimental to public interest. As a result such public service corporations become a factor in local politics, and questions involving the most important interests of both the public and the corporation have become issues in local political campaigns. Such issues often involve economic laws and sound business prin-

ciples which can not be determined by the votes of an uninformed electorate. These unnecessary conflicts between the public and those rendering public services are the cause of more corruption in municipal government than anything else.

Students of economic science have, for many years, been endeavoring to devise a limited franchise which would be adequate during the term thereof to meet the requirements of the public as well as those of the public service corporations, but they have found it impossible to frame a model franchise of any character based upon sound economic principles which could either be limited in time or could prescribe definitely the charges to be exacted or the quality of the service to be rendered during the life of the franchise. Some have advocated the granting of short time franchises, but such franchises of necessity impose an unnecessary burden upon the public. If a franchise is to be limited in time, provision must be made for its amortization. This compels the public not only to pay a fair return upon the investment during the life of the franchise, but also to provide a sinking fund which, with the scrap value of the plant at the termination of the franchise, is equivalent to the original investment. Others have advised the adoption of franchises for long periods of years, reserving to the municipal councils the right to fix rates and establish standards of service at definite intervals or from time to time at the will of the councils. The general experience under franchises of this character has not been such as to warrant their commendation. Intelligent action on the subject by a common council has been rare. The expenditure of large sums of money by some of the larger cities to ascertain all the essential facts necessary for intelligent and lawful action on the part of common councils invested with power to establish rates, has been more frequently wasted than profitable, as the facts thus acquired have generally been ignored and action taken which was either prompted by prejudice or based upon ulterior political considerations. Litigation necessarily followed which involved the further outlay of large sums of money on the part of the public and utility, all of which, in the end, had to be paid for by the tax payers and the patrons of the utility.

From an economic standpoint, an unlimited franchise with the provision that the municipality may revoke it at any time upon condition that it acquire the plant by paying to the company the reasonable value thereof is generally regarded by those who have given the subject exhaustive study and consideration as the best kind of franchise. The necessity of the service in all probability will not terminate with or prior to the time of the expiration of the limited franchise. As far as it is possible to peer into the future, public utilities now operating, or others of like character, will be required to render services to the public after the termination of existing franchises. It must be obvious to all who have given the subject any serious consideration that an indeterminate franchise containing the provision that the rates and services shall, at all times, be subject to revision by an impartial and independent tribunal, will result in the greatest good to the public as well as to the investors in such enterprises. It will eliminate all friction between the community served and the agency serving it. Naturally such a policy would be opposed by the average municipal politician who rides into office either as a champion or an opponent of the public utility which is usually a factor in municipal politics.

It was with a view of placing public utilities upon a sound economic basis and eliminating all unnecessary friction between the public and such concerns due to causes arising from ignorance of the economic status of public utilities, and their moral and legal relations to the public, that the Wisconsin Public Utilities Law was framed and enacted. That public utilities are virtually monopolies by nature and must be dealt with as such in any just and comprehensive system of state regulation is the fundamental economic principle upon which the law was constructed. Without protection of such monopolies only a limited and inadequate supervision of their affairs by public authorities can be morally justified. This is almost axiomatic. At the very foundation of the Wisconsin system lies a uniform indeterminate franchise, denominated " an indeterminate permit," which gives the corporation a legally protected monopoly. It can never be deprived of its property unless the municipality determines to acquire the same, and then

just compensation must be paid therefor, which is fixed and determined by the Commission. Our Supreme Court in a recent case, commenting upon the wisdom of this provision of the law, said :

" That one of the principal mischiefs sought to be remedied by the new system was elimination of the conditions promotive of hostilities between municipalities and public utility companies, after making large investments by permission and invitation to serve the public directly as well as indirectly—bitter controversies, sometimes for good reasons and sometimes not, but in any event at the expense of consumers of the product—seems quite certain.

" It likewise seems certain that one of the major means for attaining the desired end was elimination of excessive investments, and excessive expenses caused by two or more public utilities, each with its separate property and fixed charges, where the need of the consumers only required one, and elimination of risk to investors by encroachments, or threatened encroachments, upon an occupied field of public service without any public necessity therefor. Doubtless an unvarying and invariable economic law was squarely faced and appreciated, that all such subjects for elimination represent waste, which if not avoided would, in the main, fall on the product, increasing the cost of service per unit and be paid by the consumers. It was the interests of consumers which was the prime subject of legislative solicitude; such object to be conserved without injustice to others.

" In the situation pictured it could not have escaped legislative consideration, and, necessarily, would not have been considerately left unguarded against that in the cities and villages of the state, in general, public utility service at the lowest practicable rates with the highest practicable efficiency, is impossible without combining the municipal service with that to others.

" Further, it could not well have escaped appreciation and been left unguarded against, that one of the fruitful sources of waste to ultimately fall, largely if not wholly, on consumers, and fruitful sources of wasteful controversies and injustice to owners of existing investments, many of whom were bondholders as in this case, was opportunity for municipalities to unreasonably menace

existing investments by threatening to displace, or actually displacing, in whole or in part, existing public utilities in cases where proper regulation would secure efficient operation; ample efficient service in the whole field, thus creating waste in many ways and to a large amount in the aggregate, to the impairment of efficiency, in general, and enhancement in cost per unit of service to the customer, contrary to the purpose of the act."

From the administrative standpoint, the vital provisions of the law are those relating to valuation, accounting, service and rates.

VALUATION

The law imposes upon the Commission the duty of valuing every public utility plant in the state. It is essential that the capitalization upon which returns are to be allowed be determined in order to deal justly with the matter of rates. The law does not attempt to establish any inflexible rule for determining valuation. In view of the conflicting theories of ascertaining the capitalization of a public service corporation for rate-making purposes and in the absence of any controlling judicial authority indicating the correct measure of the various elements of value that enter into the computation, the law is expressed in comprehensive terms and leaves to the Commission the task of determining the probative effect of the value of such elements when ascertained upon the hypothesis of any of the theories advanced. It merely provides that the Commission shall value all the property of a utility "actually used and useful for the convenience of the public" and separately state the value of the physical property of such utility. In a somewhat recent case the Commission had occasion to review the decisions of the courts bearing upon the question of the proper capitalization in a rate case, and expressed its attitude upon the subject in the following language:

"It must be stated that only so far as the reasoning of such authorities has appeared to us as consonant with sound economic principles and applicable to the situation disclosed by the investigation, has it been accepted. No slavish following of precedent or theory, regardless of effects, has been attempted. The controlling

motive in our deliberations has been to attain a result which would be practicable of application and absolutely just and equitable to all concerned."

Every element of value, both tangible and intangible, is to be considered in reaching a result, excepting only franchise values, which are necessarily excluded by the general policy of the law. The object to be attained is the fair value of the property as a going concern. This, in the contemplation of the statutes, is the proper capitalization upon which returns must be allowed.

In this discussion it will not be possible to give more than a brief consideration to the method employed in making such valuation, which perhaps differs in some essential respects from that heretofore generally in vogue. The elements usually available for consideration are the original cost of construction, the amount expended in permanent improvements and extensions, the reproduction cost and the same, less depreciation, and the going value. In arriving at a fair and equitable appraisement of the physical structure, the Commission has considered, as more or less controlling, the reproductive cost based on the average prices of material and labor for the five years immediately preceding the time of appraisement. Such basis eliminates the effect of sudden and marked fluctuations in market prices, often due to temporary causes, and experience has shown this to be the best means of arriving at fair averages. The results thus attained have been so obviously just and equitable that the municipalities generally have acquiesced therein. Nevertheless, for the sake of comparison and illumination of the subject, the reproductive cost based on current prices also is considered. The Commission has never confined itself to any one basis to the exclusion of others in reaching a conclusion. Every factor bearing upon the subject is carefully weighed and such importance given to it as the situation in the light of all the circumstances demands. While a norm of universal application might be desirable, yet, from the very nature of the undertaking, such is impossible. In the last analysis, enlightened judgment and conscience must be applied to the facts in hand if a just determination is to result.

The first case involving the method of valuing public service properties, adopted by the Commission, to reach our Supreme Court was the Appleton Water Works Case. The valuation was made in a proceeding by virtue of which the city acquired the property. Chief Justice Winslow, speaking for the court, said:

"They (the Commission) had before them much evidence bearing on the general question of value, and just compensation from different angles; they had the very careful and elaborate estimates of their engineers, not only as to the cost of the reproduction of the plant and its present value based on present prices, but also based on the average of prices for five years; they had all the testimony given in the rate case showing inadequacy in the present plant to meet the reasonable demands of the public service, and the necessity of the immediate expenditure of at least $50,000 to make the plant reasonably efficient; they had tabulated statements furnished by the company itself in the rate case which tended strongly to show that the revenues of the plant has not been sufficient at any time to give anything more than an insignificant return upon the investment, if indeed they had given that; they had very complete information as to the condition of the physical property, the attitude of the public toward the concern, the probable growth of the city, and in fact of all the surroundings; they had also expert evidence as to the actual unrequited cost of building up the business of the plant, and expert evidence on both sides as to the probable unrequited cost in building up the same business with a new plant under present conditions, which estimates differed by many thousands of dollars. All of this testimony was considered by the commission in passing upon the ultimate question of value; it seems very clear to us from the report of the commission that all the facts in evidence bearing on the question of value were carefully weighed by the commission; we discover nothing to indicate that the commission acted on any mistaken basis in reaching the conclusion that $255,000 was the fair and just compensation which should be paid for the plant."

ACCOUNTING

An important feature of the work in administering the law was the establishment of uniform classifications of accounts. It will be recognized that before standards of efficiency and economy in management can be established, it is necessary to have comparative statistics, illustrating what has been and can be accomplished by the various utility plants. For this purpose a common schedule of reporting financial, operating and statistical information was devised and a uniform classification of accounts prescribed to insure identity of treatment in reporting the separate items of the balance sheet and income account. These classifications have now been in effect for over three years. In addition to the utilities operating under them in Wisconsin, numerous companies in other states as well as in other countries have voluntarily adopted the prescribed accounts with little modification. One of the features of these accounts, in which the classification differs from similar prescribed classifications in other parts of the country, and concerning which it was submitted at first to much criticism, is that it endeavors to serve as a basis for ascertaining the cost of service. Although it is self-evident that no business of the character involved in public utility service can be successfully conducted without an accurate knowledge of the cost of rendering the service in which the utility is engaged, it was surprising to learn that while the best conducted privately owned utilities had in a measure recognized the importance of such information and had somewhat imperfectly attempted to ascertain the same, the majority of the managers of municipal plants had generally been wholly oblivious to the necessity of any such knowledge. This lack of efficiency on the part of the managements of municipal plants has been due partly to various causes, many of them beyond the control of the municipal utility plant. The first of these is the question of organization and responsibility. A part of the public function or department of city government is frequently administered by a superintendent, board of public works, engineer, board of commissioners, or committee of the common council, and it is

frequently difficult to ascertain just where the duties of these individual city officials begin and end.

Again, the matter of rotation in office seriously interferes with continued efficient management. Executive rather than merely administrative ability is necessary in order to successfully conduct a utility plant, and it is to be regretted that the occasional good executive must be made the sacrifice to party policy.

Accounts pertaining to municipal plants were often merged with other accounts of municipalities, and even where separation was made the accounting was so crude and inaccurate that it was impossible to ascertain therefrom, even approximately, the cost of any class of service.

The local authorities in control of municipal utilities were at first slow to respond to the demands of the Commission, except in the most progressive communities. In some instances it appeared that those in charge of such plants were apprehensive that proper methods of accounting might result in disclosures reflecting upon the capacity or integrity of the management. In other instances there seemed to be no one in the organization of employes capable of keeping a set of books intelligently. This was particularly true where the management changed with the municipal administration. However, in practically every community where the management was entrusted to a non-partisan board, whose personnel was more or less permanent, there was no difficulty in securing hearty co-operation in putting into effect the prescribed system of accounting. At the present time, practically every utility within the state, whether municipally or privately owned, is now keeping its accounts according to the system prescribed by the Commission.

As the various plants are classified according to size, comparison in results of operation between plants in the same class has proven of inestimable value to the managements of all plants, either publicly or privately owned. By studying the accounts of the various plants, the Commission is enabled to become familiar with the details of operation of each plant and to point out to the management economies that may be adopted and improvements that may be made in the conduct of the business.

Balance sheets and accompanying reports of various utilities are becoming matters of increasing interest and investigation on the part of the public, and as they reflect the experience and result of operation of each plant self interest as well as public sentiment is being engendered by comparative study of such statistics and is inducing alertness in the management of such enterprises, whether municipal or private, to observe and adopt economies in operation, extend the business, improve the service, and lower the cost to the patrons.

SERVICE

In the matter of the regulation of service, the work of the Commission has been most effective. Standards of service have been established to which every utility is required to conform strictly. To detect violations of the rules relating to service, the inspectors of the Commission are constantly traveling through the state making secret inspections. These rules differ materially from those in vogue in other states and countries. They place the responsibility for the character or the quality of the service primarily upon the utility, which is required to test its own meters and make various other specific tests of the quality of the service prescribed in the rules and regulations and also to keep a record of the results of all such tests, which must be kept open for public inspection. While the accuracy of meters is an essential element in the economic use of both gas and electricity, the maintenance of adequate pressures is more essential to the efficient use of either. Consequently, general systematic surveys of gas pressures and electric voltages by means of recording instruments are made. The gas inspectors are, in their investigations, required to test the quality and purity of gas, take records of pressure in various parts of the systems, supervise the testing of meters and calibrate the testing equipment. The electric inspectors take continuous records of voltage over the distribution systems, calibrate the companies' standard instruments and supervise the testing of consumers' meters and the renewal of incandescent lamps.

When the general survey of the service in the state was first

made, it was found that few of the plants were able to comply with the prescribed standards without making alterations and improvements. Hundreds of thousands of dollars were spent by the different utilities in order to bring their equipment to the point where compliance with the rules of service was possible. Many of the managers of the municipal plants were reluctant to make the necessary changes in order to improve the quality of their service; nevertheless, through persistent importuning and threats of prosecution on the part of the Commission, the necessary changes are being made gradually, and additional equipment installed where necessary.

There are forty gas plants in the state which are under the control of the Commission and subject to regular inspection. As a result of the improvement in the service, the heating value of gas has been increased from five to thirty per cent. The pressure has been rendered adequate. Without considering any change in rates for gas, but solely through the increase in heating value and pressure, the consumers of gas in the state are receiving from fifty thousand to seventy-five thousand dollars more annually in value of service than previously

At the time that systematic inspection was undertaken, only about fifteen of the two hundred and fifty electric plants in the state, serving some fifteen thousand consumers, were giving reasonably satisfactory voltage. In order to comply with the requirements of the rules of service, about forty plants had to be generally overhauled and practically reconstructed. In the remaining plants it was necessary to install governors, automatic voltage regulators, and additional transformers, and also to make extensions and changes in the structure of the plants and distribution systems. Some of this work has not yet been completed and it may be stated that about fifty thousand consumers of electric current out of a total of seventy-five thousand are now receiving satisfactory electric service as measured by the prescribed standard. In this connection it must be borne in mind that the state regulation of voltage is new and that work similar to this scope has never before been attempted. While the money saving to the

consumer resulting in an increase in the heating value of gas may be accurately estimated, the saving in electric current due to uniform adequate voltage is difficult of exact determination. For example, a foot of gas containing six hundred heating units will do twenty per cent more work than a cubic foot of gas having a heat value of five hundred heat units. Where voltage is defective, the increase of the voltage to meet the standard requirement increased the light correspondingly. This renders the service more satisfactory. There is, however, as a result of the improvement of service, according to the computation of the engineers of the Commission, a money-saving of at least seventy-five thousand dollars annually to electric consumers.

About eighty per cent of the water works in the state of Wisconsin are municipal plants. Most of the activity of the Commission in respect to these has been directed to the testing of the quality of the water supply, the accuracy of meters and the sufficiency of pressures. Careful investigations are made of the character of fire streams and the adequacy of the systems to furnish necessary fire protection. It has been discovered that with the growth of the communities there has not always been a corresponding development of the water system and enlargement of pumping stations, and as a result the plants become inefficient to render proper service. At times, discord in municipal councils over water works affairs has arisen and delayed making the necessary improvements required to meet the needs of the communities. In one of the larger cities of the state a controversy of twenty years' standing over the source of the water supply, which has been a polluted river, prevented necessary extensions of the distribution system being made, and, in consequence, a large portion of the city was without adequate fire protection. A part of the community favored the installation of a filtration system, while the remainder contended that investigation should be made of the subterranean waters for the purpose of ascertaining whether a sufficient supply of permanently pure water of suitable quality could be found, and if so, that the river supply be abandoned and the water taken from wells. The water question was an

issue in every municipal election, but neither faction could ever control a sufficient number of the members of the common council or of the voters to authorize a bond issue for carrying out their ideas. Finally, at the instigation of the mayor, twenty-five citizens filed with the Commission a petition against the city, praying for an order compelling the city to make the necessary improvements in the water works and to supply the citizens with pure, wholesome water. In the course of the investigation, an expert of the Commission caused to be sunk a number of test wells for the purpose of determining whether an adequate supply of suitable water could be obtained from subterranean sources. An excellent underground water supply was discovered at a point within easy access of the city which could be developed at a very moderate cost. Upon the completion of the investigation, the Commission made its report wherein the city was ordered to take such steps as were necessary to develop the water supply discovered, reconstruct its plant and extend its system. Upon the receipt of the report of the Commission, the common council unanimously voted the necessary bond issue and placed the work in the hands of an engineer. It will not be long until this city will have an adequate water system supplying its inhabitants with one of the best waters that can be found anywhere.

RATES

At the time that administration of the law was first undertaken, it was found that there were few public utilities in the state which did not have in effect a large number of discriminatory rates. While all had established schedules of rates, the departures from such schedules were numerous. Free and reduced rates were given to favored persons. Many thousands of such discriminations were in existence. While the practise of discriminating between patrons in the matter of rates and service had become general, as is usually the case where there is no independent tribunal provided by law charged with the special duty of enforcing the obligations of public utilities to the public, it was difficult for the utilities, in many instances, to wipe out the discriminations of their own accord.

These had often been forced upon the utility by those having more or less influence in the community, and who were in a position to harass the utility through the common council and otherwise unless they were favored as patrons. Such influences were not entirely unlike those which, a few years ago, often compelled railway companies to indulge in similar practises. By a general order, the Commission compelled every utility in the state to eliminate discriminations of all kinds and charge the regular schedule rates.

As rates made by the Commission are based upon the cost of service, the Commission has, in each instance where a schedule has been challenged, worked out a scientific schedule which classified the services according to the cost thereof. The result of this has been most gratifying. Business has extended and the returns to the public utility increased. As an illustration, one of the largest public service corporations in the state, operating both a gas and an electric plant, valued at approximately one million dollars, was obliged, in a rate case, to put into effect a scientific schedule of rates, which provided a reduction of the maximum rates theretofore in effect, but so classified the service that the consumers in each class were paying for the services rendered, rates based upon the cost of the service to the utility. The company estimated that the new schedule of rates would operate to reduce its net revenue approximately thirty thousand dollars per annum. Much to the surprise of the management, the business at once began to develop, and as a result of the expansion thereof, within less than two years the management voluntarily applied to the Commission for authority to make a further reduction of rates. This is but one of the many instances of this character that might be called to your attention.

In order to facilitate work along lines of establishing scientific schedules of rates, the Commission has published the rates, rules and regulations of all the utilities in the state, and by comparison and by the use of hypothetical plans, has demonstrated what are reasonable rates, rules and regulations. In a number of cases, small utilities have asked the Commission to revise their entire schedule of rates. In fact, utilities often come to the Commission

asking that a schedule of rates be provided which will develop their business. Generally the managements of the utilities carefully study the decisions of the Commission, and are often thereby able to adjust their schedules of rates upon the principles governing the Commission in its actions. Perhaps the larger number of utilities in the state are today operating upon schedules which are more or less scientific and based in a measure upon the cost of the various services rendered. It is gratifying to know that such utilities as have established such schedules of rates have been able to extend their business greatly, increase their operating revenues, and their net incomes, and reduce the cost of the service to the consumers. This is particularly true in the case of gas, electric and water utilities.

RATE OF RETURNS

In this connection, brief consideration may be given to the rate of return allowed on the investment in a public utility enterprise in the state of Wisconsin. The inquiry is often made by those interested in utilities outside of the state of Wisconsin as to the rate of return that is allowed to a utility in Wisconsin. In reply to this it may be said that the Commission has never and does not intend to establish any fixed rate of return. In one of its decisions it expressed its views on the subject as follows :

" The rate of return which must or should be allowed on whatever investment may be determined to exist, obviously depends both upon the class of the utility enterprise—whether gas, electricity, water, telephone, etc.—and the character of the individual plant and the circumstances under which it is operated within the class. Whatever rate of return may be determined upon, this rate must be sufficient, under all the circumstances, in each case to attract capital to that individual or class of enterprise. It is almost commonplace to state that capital is subject to the accepted laws of competition, and that the gross rate of return which it can command depends upon competitive forces. The competition of capital among different industries and localities in the same country, as well as the competition of capital among foreign countries, is

well understood. These national and international competitive forces control the rate of interest everywhere, including Wisconsin. What the particular rate of interest is or will be is purely a matter of experience. The money market reflects and determines it. There are great demands for investment funds in the Orient, Africa, South America, in the islands of the Pacific Ocean, in Alaska, in the West Indies and other places, not to speak of demands at home. Wisconsin can not aggregate itself and stand in isolation as if exempt from these forces. It is fully and completely subject to them."

Our Supreme Court has declared the policy that should govern the Commission in dealing with the revenues of public service corporations in the case of the Minneapolis, St. Paul and Sault Sainte Marie Railway Company against the Railroad Commission, 116 North Western 913. In passing upon an order of the Commission, the court said:

"In determining whether or not the order of the Commission is reasonable, it must also be considered that every unnecessary burden imposed upon the railroad impairs its net receipts and diminishes that margin, if there be one, between the amount sufficient to assure a fair return on the value of its property, plus the amount of its fixed charges and operating expenses, and its gross receipts. In this margin the public and the railroad are interested, because it is only when this exists that betterments in construction or improvements in service not imperative or indispensable, or reduction in rates, will ordinarily be voluntarily made by the railroad or can ordinarily be ordered or enforced by the Commission. We are not now speaking of those extreme causes where public duty must be discharged, whatever the financial consequences to the railroad. But in ordinary cases to waste this margin is to waste the fund in which the whole public is interested. This should never be done for the benefit of the few, as against the interests of the many.

"It is also to be considered that this margin ought not ordinarily be exhausted or swept away by orders or requirements of the Railroad Commission as fast as accumulated, because human

nature or railroad nature is such that no one will long economize on operating or other expenses if this economy only furnishes a larger basis for further exactions."

In conclusion, I may briefly speak of the wisdom of the regulation of local public utilities by means of a state commission. Any one who has given study and consideration to the subject and who has observed the results obtained by the regulation of such concerns by means of a central tribunal must be convinced that such a system of regulation is preferable to a system of regulation by any local municipal authority. Intelligent regulation of public utilities requires engineering, accounting and statistical skill of a high order. Those entrusted with the work of investigation and study of the various subjects presented for consideration must have scientific knowledge in the respective branches or departments of utility management and operation. With a competent staff of experts in the different lines of service, engaged constantly in examining plants throughout the state, it is possible for the regulating board to bring to the solution of every problem arising a breadth of vision and experience that is invaluable both to the public and to the utility. No regulation can be effective which is not based upon accurate information and which is not actuated by a sense of justice and equity. In the light of the past, it must be conceded that an independent tribunal, free from local influences and prejudices, and assisted by a corps of trained experts, is better qualified to efficiently regulate public service corporations and individuals engaged in public service than any municipal council or local tribunal. In few instances would it be possible for municipalities to maintain the necessary organization of competent assistants to deal intelligently with the problems involved in the regulation of public utilities. The cost of such an organization would be prohibitive to most municipalities. In central control there is therefore not only efficiency but also economy. One body can serve all municipalities as well as one municipality and serve them better. After six years of administration of the Wisconsin law, the results obtained from its operation have been generally satisfactory. Our experience indicates that a comprehensive

system of regulation such as provided by our law is not only advantageous to the general interests of the public, but as well to the business interests of utilities.

Mr. Henry L. Doherty in discussing Mr. Roemer's paper said:

As public service men, there is no subject that is on our minds more acutely than the matter of public service regulation. I don't think anybody could have heard the paper read by Mr. Roemer and not be reassured by the intelligent grasp of the situation that he has shown. I say this not to compliment him, because my acquaintance with him goes back to the early days of the Wisconsin Commission. I think it was my fate to fight out with the Wisconsin Commission the first case of valuation and rates which they had before them. I don't believe I will ever have the pleasure of dealing with three more intelligent and fair-minded men than made up the Wisconsin Commission, and I believe that the Wisconsin Commission has blazed the way for the work of all the modern commissions in the different states. On the other hand I am forced to say that the wildest idea of liberality on the part of the Wisconsin Commission would not reach my narrowest idea of liberality.

Now, I don't believé that the man who has charge of that regulation, primarily on the part of the public, can possibly see the thing in the same light as the man who is charged with the responsibility of finding the capital to develop the enormous enterprises that must be developed and are fundamental to the development of this country. We have something like 8,000,000 undeveloped horse power, undeveloped hydraulic power to the extent of 8,000,000 horse power. It has been lying there for many years, and it looks to me as if it will continue to lie there in a great many states, unless the public show greater liberality than they have heretofore shown. Behind this public utility commission, that is in the public mind, lies the feeling that they want to regulate the corporations. There is a wave of antagonism that has swept this country for a good many years against the corporation. I believe the corporation is the keynote of the wonderful progress made

by this country. I think it is in organizations like this that we ought to be able to speak freely and tell of the advantages of the corporations and start a propaganda that will bring about the necessary liberality or the necessary fairness, for I believe today that every corporation in the country is asking for a square deal—in fact, I think this is about the only thing they are asking for.

I would like to see the public service commissions charged not only with the regulation of the present public service corporations, but with the necessity of finding the people and the capital to develop all the resources of the state. Now, it is an easy matter to say what the people who are in business shall or shall not earn, but it is quite a different matter to develop the resources of the state, and it is the men like Mr. Roemer and the other heads of the various commissions who are going to determine, in great measure, the amount of development work there will be in their respective states, because, as he has very wisely said, the capitalist has the choice of a state with a commission or a state without a commission, or of a foreign country. Sending American capital abroad for the development of other countries is going on to a greater or less extent already. And I believe that not only that, but that the establishment of these commissions will check developments in each of those states. For instance, our firm has not attempted a development in the state of Wisconsin since the—yes, we did attempt one, where the capital was already issued, but outside of that we have not attempted a development in the state of Wisconsin. This country today needs at least forty per cent again as many miles of railroad as we already have, and I don't know whom we are going to find to build those railroads unless they are promised an adequate reward, an adequate reward insured by giving an adequate reward to enterprises already built.

Now, you can show me no city where the public utility has advanced greatly in value, where there has not been an advance in the value of land at least ten times. Who made that advance in the valuation? Not the owner of the real estate; as a rule he has contributed but little. Take a man, A, going into a town and helping to create the town by building a street railroad, and B, buying

real estate. A does something to make real estate valuable. B does not have to do anything but hold it. And if you leave it to everybody to hold the real estate and nobody to build the railroad, we are going to have very slow progress. The same thing is true of our steam railroads in the development of new territories, and we are facing a problem now, and it is up to us to educate the public as to what constitutes the necessary liberality in capitalization and in rate of return to bring about this development, and that depends upon how fairly and how liberally your existing enterprises are treated by these various commissions.

Now, while I started out by saying that the most liberal ideas of Mr. Roemer and his associates would not meet my narrowest ideas, still I realize that they have been a safer and more intelligent commission than I know of anywhere else. I know they represent the idea that we are all getting more than we should be getting, and that the corporations of this country have made a great mistake for a great many years, and now they have got to do something more, they have got to average up for their past shortsightedness. We have been in the habit of believing that public opinion is so massive a thing that it hardly paid to educate it. Our theory has been that it was easier to talk to a few members of the legislature, to sit down and show them what we thought was fair and we were entitled to have, and for that reason we have had many cases of legislators who are better informed, not in sympathy with the great mass of public opinion. And when the legislature found that they could not do what they thought was the right thing by corporations, but insisted on meeting the views of public opinion to a certain extent, then we relied upon the courts, and we find that both the legislature and the courts are more influenced by public opinion than by anything else, and if not so influenced they can not remain in office. We have failed to educate the public. The corporations of the country have come into ill-repute for that reason, and now we have learned that we not only must do it, but must overcome the prejudice that has been already created; and it is through organizations such as this and the Jovian Society, and through the intelligent discussion of such

matters and bringing forth arguments that can not be met, that we must in the end convince the great mass of the public.

Now, the public today believes that any capitalization of an enterprise in excess of the actual dollar for dollar cost of that enterprise, is watering stock and almost criminal. I believe in capitalization in excess of cost and I don't believe it is possible to do it any other way; and I have never yet failed, given time enough, to convince any man, however radical, that things are worth more or less than what they cost. I might spend a million dollars on some ill-advised scheme, and when I got through, if it was not capable of earning a proper return on the million, it would not be worth a million, and nobody would give me a million for it, no matter what had been spent on it. On the other hand a man might bring me a water-plant which can be bought for a few thousand dollars, and the necessary machinery, together with the plant, will require perhaps a million dollar investment. The man who furnishes the money to create that plant must feel certain that he will have something that is worth more than what it cost to create it. If it has a greater value, it should be capitalized, not for what it costs, but for its value. I use the example of the water-power plant because I think it is the best example that falls within the scope of these commissions. Certainly no one would take a risk of building a water-power plant unless he had reason to believe that that property was going to be worth much more than its cost. And I maintain, in figuring the value of these going and existing properties, that an allowance should be made for their valuation, very greatly in excess of the possible property you can find on one of these inventories. When we made the first inventory on the Madison Gas and Electric Company, we did n't find anything like our property, and we kept raising and raising it. And today, if you were to start out to find the actual money that was spent for the development and improvement of this Island, I venture to say you could n't find forty cents on the dollar, and yet the only way you can get at it is to inventory all the property you can find in sight, and when you use that method you must use a multiplying factor considerably in excess of the property you find.

I did n't mean to take up so much time. I wish we could start here some Monday morning and discuss this problem until the next Saturday night, then I think we would have a good start. But it is to men like Mr. Roemer and his associates on the committee and to Mr. Alfred Ericcson—men in whom I have great faith—that we should look to educate the people. We should have them help us to put them in shape so the public can thoroughly understand them.

I went out before the Manufacturers' Club in ———, at the time they had their public service bill out there, and I met some of the men that were the most radical in pushing that public utilities bill, that did not pass for three or four years afterwards. The man who had been painted to me as the most drastic in his ideas, came to my room after I had spoken, and said, " Do you believe what you have said? " I said, " I certainly do." He took up one argument after another, and said, " It seems to me there must be some good answer to these things, because those arguments have never been presented to me before." So we took them up one by one, the matter of capitalization in excess of cost, and things of that kind, and when he left my room he said : " Well, I am not so sure of my position as I have been. You have not convinced me yet, but I am not going to do anything until I am a little surer about my position." Here was a man who was painted to me as trying to make all the trouble he could. He said, " I went to this man and this man and tried to get justification of capitalization in excess of cost, and I could n't get anything to satisfy me at all."

If I can have a few minutes more time, I want to read a few pages of something here. As business men, men at the head of great institutions, there is nothing done by us collectively to meet the matters that make us trouble, whereas, if we would anticipate them and go at them in advance, we would n't have to meet the trouble. The other day a man came into my office and wanted my help in starting a campaign. They were going to publish a periodical to represent the construction business side, and it seemed to me they were going about as wrong as they could on it, and I told him so,

but I did subscribe. All the good it could do, in my mind, was very small because it would n't reach many and it would start to occupy a field, and the other people would n't then occupy that field, while it seemed to me the thing to do was to get the existing publication to occupy that field. I think then, after that, I would like to get the men together who are responsible for the progress of this country, and then I would like to get this man Herbert Kaufman, or a man like my friend here, Mr. Hubbard, who has the faculty of stating things in a way to impress people, to write our story, and then get him to put it in language that the people could understand. I think there are only two and three-tenths per cent of the males of this country above twenty years of age who have had the benefit of higher education. I have always assumed that if you talk in a language that the ninety-seven and seven-tenths per cent could understand, the other two and three-tenths per cent ought to be able to understand it, but I am sorry to say that sometimes they can't; but here is one man, and I know that any one in this room, with the possible exception of Mr. Elbert Hubbard, would agree that he could n't write in this way. It is a little book by Herbert Kaufman. The first essay is splendid, and if you have n't read it I want you to just listen and see the difference between the man who knows the English language as the teacher in the college, and the man who can take pictures in the mind. It is headed

THE DREAMERS

"They are the architects of greatness. Their vision lies within their souls. They never see the mirages of Fact, but peer beyond the veils and mists of doubt and pierce the walls of unborn Time.

"The World has accoladed them with jeer and sneer and jibe, for worlds are made of little men who take but never give; who share but never spare; who cheer a grudge and grudge a cheer.

"Wherefore, the paths of progress have been sobs of blood dropped from their broken hearts.

"Makers of empire, they have fought for bigger things than crowns, and higher seats than thrones. Fanfare and pageant and

the right to rule or will to love are not the fires which wrought their resolutions into steel. Grief only streaks their hairs with silver, but has never grayed their hopes.

"They are the Argonauts, the seekers of priceless fleece,—the Truth.

"Through all the ages they have heard the voice of Destiny call them from the unknown vasts. They dare uncharted seas, for they are the makers of the charts. With only cloth of courage at their masts and with no compass save their dreams, they sail away undaunted for the far, blind shores.

"Their brains have wrought all human miracles. In lace of stone their spires stab the Old World's skies and with their golden crosses kiss the sun.

"A flash out in the night leaps leagues of snarling seas and cries to shore for help, which, but for one man's dream, would never come.

"Their tunnels plow the river bed and chain island to the Motherland.

"Their wings of canvas beat the air and add the highways of the eagle to the human paths.

"A God-hewn voice swells from a disc of glue and wells out through a throat of brass, caught sweet and whole, to last beyond the maker of the song, because a dreamer dreamt.

"What would you have of fancy or of fact if hands were all with which men had to build?"

"Your homes are set upon the land a dreamer found. The pictures on its walls are visions from a dreamer's soul. A dreamer's pain wails from your violin.

"They are the chosen few—the Blazers of the Way—who never wear Doubt's bandage on their eyes—who starve and chill and hurt, but hold to courage and to hope, because they know that there is always proof of truth for them who try,—that only cowardice and lack of faith can keep the seeker from his chosen goal; but if his heart be strong and if he dream enough and dream it hard enough, he can attain, no matter where men failed before.

"Walls crumble and empires fall. The tidal wave sweeps from

the sea and tears a fortress from its rocks. The rotting nations drop from off Time's bough, and only things the dreamers make live on."

Now, I would like to see men that have charmed us like that, take the material furnished by us who are trying to do something in the constructive line; I would like to see them take our story and put it in a language that would appeal to the people, and then give the press of this country such support that it would be taken up by the existing press. Instead of starting other mediums to compete with them, a better idea would be for ten thousand men to subscribe to a number of magazines or newspapers that will take up the constructive side of this whole problem. It is the circulation of a magazine that gives it power, no matter how much money it takes in, and I venture to say that by thus enlarging the circulation of the magazines and greatly increasing their power, we can then, if we use existing talent such as that of Mr. Kaufman and others, tell the people the real story, for their real good.

Mr. G. E. Miller, discussing Mr. Roemer's address, said: I want to ask Mr. Roemer a question, briefly. Those of us who have recently come under the control of public service commissions are running into new problems all the time, and one of them that has come to me is this, and I would like to ask Mr. Roemer, from his experience, what his opinion is as to surplus funds other than those which are simply taking care of fixed charges, etc. The reason I ask this is that in almost any other enterprise in a community, a man who can go along year after year and pay interest on his investment, and then, in addition to that, return to his stockholders anywhere from ten to one hundred per cent, is looked upon as a sort of wonder in the community, and everybody points to him with pride and has a good word for him. Let a public service company accumulate anything above simple interest or a fair remuneration, and the community commences to frown upon it as a robber.

There are, as we all know who have followed the industry for a

number of years, waves of depression which pass over the country, and, if we are only to be allowed a reasonable return on our investment during prosperous times, without accumulating surplus funds for emergencies, how are we going to bridge over the lean years, the periods of business depression, how are we going to attract capital which has to go into our properties year after year as they are growing, if we are not allowed to set aside reserve funds to be used for such purposes? I would like to ask Mr. Roemer what his views as a commissioner are on this question.

Mr. Roemer, answering Mr. Miller, said: I fully agree with you that a railroad company or any other enterprise should always retain a reserve fund; otherwise it would be impossible to attract capital to that enterprise. That is a pure, simple business proposition which public service commissions are obliged to recognize, notwithstanding it is unpopular among the people. But I think the people will understand that you have got to deal with the public service corporation the same as with any other corporation —that is all it is in the end.

Dr. Charles P. Steinmetz discussed Mr. Roemer's address as follows: With regard to the question discussed here, I would like to ask whether there is not a certain difference between different enterprises. Some enterprises, and I believe they are among those that Mr. Doherty had in view, are of such a character that the money invested in that enterprise may bring no returns at all, but may be a complete loss. That sort of enterprise naturally must have the right to earn abnormal returns to make up for the possibility of not earning anything, but being a dead loss. That class of enterprise should have the right to average enough to give a fair return. Again, if you consider enterprises which by their nature are fairly safe, or are absolutely safe, as, for instance, if I invest in a mortgage of an established city, there is no excuse there to allow abnormally high returns, because there is no danger of loss involved. And I believe here is quite a great difference. If I develop a water-power, I may never get any return from that, and therefore there must

be a chance to get abnormal returns, otherwise it would n't attract capital; but if the investment is in a thing where the return is assured, I don't see why there should be a chance of abnormally high returns, because there is no chance of a loss. But if I carry the first railroad across the continent, where most people did n't believe that a railroad would ever pay, certainly there ought to be the possibility and the right of an abnormally high return to compensate for the possibility of loss. That should be considered differently. In general I think it ought to be stated that every enterprise is entitled to a fair return, but not more. But what is a fair return is not to be determined in per cent for each individual return. A fair return on a new development which is questionable of success, may be 100 per cent, while in another one six per cent may be an unfairly high return, depending on the character of the enterprise, and I think its character should be considered.

Mr. James Mitchell further discussed Mr. Roemer's address: Mr. Doherty has well said that this subject is so full of meat that we could very well take a week to discuss it. There is one case in particular that I have known to occur that would require some consideration at the hands of a public service commission. Suppose the case of a water-power development that has been unsuccessful in its earlier period and unable to await the time when its earnings would enable it to meet the fixed charges and operating expenses. It undergoes a reorganization, it is sold out at a low figure, very materially less than the work has actually and fairly cost. What is to be the attitude of the public service commission in that case? Are they to take as the proper valuation of the property its original cost in regulating its charges to the public, or the figure that it has cost the new owners under foreclosure proceedings? I suppose as time goes on some precedent will be set for the treatment of this and similar questions.

I have just one suggestion which might tend to reconcile the views of Mr. Doherty and the members of the public service commission in the matter of liberality. If we could have the members of a public service commission spend a probationary period, such

as the past summer, in New York trying to get money for some of these public utility enterprises, it might conduce later to a more liberal view on the part of the commission when considering the question of a fair return on capital.

FINANCING ELECTRICITY

MR. FRANK A. VANDERLIP

FOUR hundred millions a year, eight millions a week, of fresh capital can profitably be used in the development of the whole broad field of the electrical industry in the United States during the next five years. What the calls for new capital might reasonably be expected to reach after five years, no one can predict with accuracy, but I believe that it is a conservative estimate to say that the intelligent development of the industry as a whole could absorb four hundred million dollars per annum for the next five years, if that amount of capital were available for the purpose.

In making such an estimate, one does not need to draw upon one's imagination. There is no need to picture broadening fields of application, new methods of production and distribution, nor new uses for current. A survey of what has been going on about us comes near enough to being a fairy tale. Little more is needed than a grasp of present day statistics, compared with those of five or ten years ago, to give the basis for such an estimate.

We have seen the cost of construction and equipment of all central stations increase in the five years from 1902 to 1907 from half a billion to well over a billion dollars, making an increase of 117 per cent in that five-year period. We have seen the output in that time go from two and a half billion to nearly six billion kilowatt hours, making an increase of more than 133 per cent. The five years from 1902 to 1907 is the last period for which we have complete statistics for the whole country. The government is now collecting the figures for the five-year period ending with last year. In doing that, schedules have been sent to seven thousand stations and power plants, compared with four thousand seven

FRANK A. VANDERLIP

hundred and fifty in 1907; and it has been estimated that the cost of construction and equipment of central electrical stations will show an aggregate in 1912 of two billion dollars, as against one billion ninety-six millions five years ago. Here, then, has been a requirement in five years for central station work alone of nine hundred million dollars, or roundly, one hundred and eighty million dollars a year against a similar requirement in the preceding five-year period of one hundred million dollars a year.

When we think what is certain to be done in the way of electrification of steam railroad terminals and heavy mountain grades; when we reflect on the larger use of electrical energy for industrial power, in agricultural uses, and in the continued growth of necessary interurban lines, we do not need to look further into the possible development of the industry to see a use for four hundred million dollars a year of new capital.

That means on the average an eight million dollar new capital issue every week for the next five years. It is such a capital requirement that you gentlemen are facing, and which must be successfully met if your energies are to have the fullest field of display. Can you get it?

It seems to me there is no more interesting question that can be proposed to those interested in the electrical industry. When the matter is put so concretely as a new eight million dollar capital issue every week for five years, the size of your financial problem can be readily grasped. To get a full appreciation of the difficulties, you may well glance outside of your own field, however, and note that there will mature within that five-year period well over one billion dollars of steam railroad securities. We may well note, too, that railroad development in the last five years called for from two and a half to three billion dollars of new capital, and I would say that there is every reason to expect at least as great demands, in addition to the refunding operations, in the next five years. The railroads, then, in five years will need, say, four billions for refunding and fresh capital. States and municipalities, should they take no more new capital in the next five years than they have in the last five, will absorb in the neighborhood of one billion

five hundred millions more, so with the two billion dollars your industry will need, there should be provided between now and the end of 1918 between seven billion and eight billion dollars for these three purposes alone, to say nothing of general industry and other needs.

These are bewildering figures. They sound more like astronomical mathematics than totals of round, hard-earned dollars. The raising of these sums, however, is the practical problem that financiers have directly in front of them.

Financiers must count on two elements over which they have no control if they are successfully to accomplish the gigantic task. One factor is the size of the possible investment fund itself,—the question of whether or not there can be made available a total amount of capital for fresh investment that will meet the demand which can be clearly foreseen in these three directions alone—that of general transportation, the production and application of electrical energy, and municipal capital expenditures.

The second factor is whether or not the outlook in these fields of investment is such that the elements of adequate returns and ultimate safety will satisfy the owners of capital and lead them to direct such a vast stream of new investment into these fields.

At this time, I will not attempt to go into the first factor—the size of the possible investment fund. That would require a worldwide survey of the growth of wealth and an examination of the effect of modern legislative tendencies; it would need an examination of the drain which the vastly increased rate of taxation here and abroad is putting upon capital; of the terrific waste of militarism, that cancer which is eating into the financial life of Europe at such an alarming pace, and of the other phases of government expenditure, national, state and municipal, which are absorbing vast totals of capital into public and largely non-productive uses. It would necessitate taking note of the tendency toward individual extravagance, a tendency that is worldwide, and which is cutting into the investment fund to a startling degree.

Passing entirely this important side of the subject, making no examination as to whether or not the investment fund can possibly

be large enough to meet the demands that can be clearly foreseen, let us take up only the narrow question of whether or not the outlook in the field of electrical industry is such that there is promise of adequate return and ultimate safety sufficient to warrant an expectation that four hundred million dollars a year of fresh capital will flow into the electrical public utility field.

In spite of the vast proportions that the electrical industry has already reached, the huge total of capital investment which it represents, the substantial standardization of the business, the complete social and industrial necessity which your work has created and met, electrical securities are still regarded by the general investor, the capitalist, as occupying a new and only moderately seasoned and tried field for investment.

Among ten average investors in corporate securities, perhaps not over one, certainly not over two, have as yet invested at all in electrical securities. I think it is conservative to say that among individual investors certainly not over twenty per cent in numbers have yet recognized that securities issued by electrical corporations have come within a range which will permit investors conservatively to employ their funds in that field. It is not easy for you, perhaps, to realize how very recently it is that the whole field of your business has reached a point where an investor might fairly feel that he was not entering a field of experimentation, that the art was sufficiently advanced and standardized to make it reasonably sure that some brilliant inventor would not upset all financial calculations, that the most up-to-date establishment might not be turned into scrap by advances made in the science long before the investor had made important inroads on the coupon sheet of his bond. As that feeling of insecurity passed, and the business became more nearly standardized, there then came to be emphasized difficulties in regard to franchises, until the very phrase, Public Service Corporation, carried with it to the investor's mind unpleasant pictures of difficulties with boards of aldermen, of threatened charters, expiring franchise rights, new forms of taxation, state-fixed rates, and profit divisions with municipalities before undreamed of.

Four out of five investors at the present time have their minds closed against any investment in the securities of electrical corporations, and that is true largely because they fear the effect of present political conditions and tendencies. An investor who has such a fear may not be marching in step to the so-called new freedom; perhaps he does not recognize fully the force of the principles advocated in our new progressive politics. But, remember, he still controls his own capital; remember that it is his individual decision that determines in what field that capital will be invested. The problem that the banker has to face is to convince investors holding such conservative views about political tendencies that capital issues of this type are attractive, and when you ask bankers to convince enough investors to absorb eight millions a week of new capital issues, you are outlining a large task.

Nevertheless the time has now come, in my opinion, when no man with capital to invest in corporate securities, if he has a desire for return that is any larger than government obligations will pay, can longer hold back from the study of public utility investments. The experimental inventive stage is past. The business has a background that has now become broad enough so that one can make valuable comparisons and sound deductions. It has ceased to be a business of only small units, and the tendency is markedly in the direction of great capital issues which shall have at all times a broad market. The dangers from a prejudiced, unwise, or unfair vote by a municipality or board of aldermen are being greatly lessened by the newly organized public service commissions, and these same bodies, recognizing the monopoly character of the business, are guarding it from useless and venal competition, as they are also guarding the investor from too free capital issues by the optimistic developer, or the enthusiastic promoter.

We are a long ways from having either uniform or satisfactory administration of public service commissions, it is true. This word, commission, has a sound of wisdom, experience, and justice about it, but after all, commissions are but composed of men, and sometimes of very poorly equipped, even if honestly intentioned

men. All this takes us into the question of government itself, but I think no one will deny that the securities of public service corporations are sounder and their future more secure, on the whole, because of the tendency to place the affairs of these corporations under the control of public service commissions.

If I may be permitted to say so, I believe the highest duty that you men who are managing great public service corporations owe to the business in which you are engaged, the greatest service which you can perform for the future development of this field, lies in the clear recognition by you of the true public service character of this business, and in meeting honestly, intelligently, and freely the proper demands that the public makes upon you.

Your dream is of great central stations that will supply energy to vast communities, and from which will radiate trunk lines that will become as necessary in the lives of communities as are lines of transportation, that will produce current which will become almost as essential to our every day life as the blood in our arteries. That dream is fast becoming a reality, and it is right and proper that the public should hold over those who create such a situation a wise and just control. In the degree in which you recognize and meet this right of the public may you hope to get fair treatment in return.

The public is by no means all-wise, when it is not well informed, nor is it always just. You can cite many instances, in your field of injustice and of unwise forms and methods of control, but I believe you will find back of every injustice which you have received at the hands of the public, some measure of injustice, or unfairness, or lack of sincerity and frankness on your own part in dealing with the public.

This business you are in requires qualities of statesmanship as well as inventive faculties, technical skill, and business acumen. It requires clean cut recognition on your part that you are creating a condition of affairs wherein the business in which you are engaged becomes of vital necessity in the life of the community, and you can not and ought not to expect the community to fail to safeguard itself.

The measure in which you recognize the justice of the public's rights, the activity and skill with which you educate the public so that it can make wise decisions, the extent to which you refrain from unfairness and rapacity in the public's dealings with you, will, to a large extent, be the measure by which capital will come to recognize the security which this form of investment offers.

Those of you who keep in mind most clearly that any deviation from the highest standards on your part in dealing with the public is apt to lead to unfair retaliation and unjust regulation, by the public, of the business in which you are engaged, will find that you are creating about your properties an atmosphere which will encourage the investment of fresh capital. Nor will it be enough for you to be fair and just. You must be both patient and energetic in educating the public, in giving them information which will permit them to form wise conclusions, to make sound laws; above all, you must educate the public to recognize the tremendous importance of both high character and broad intelligence in the men who are appointed to positions on public service commissions.

The field of public supervision is new. The unavoidable mistakes even at the hands of wise commissioners will be many. In the end those mistakes will react on the development of the community itself, and if the voters can be brought intelligently to recognize this, there will be a strong force of public opinion to compel the appointment of properly qualified men to these positions of far-reaching influence.

Not only must you throw all the force you can in the direction of securing properly qualified men on the commissions, but you must more broadly inform the public, so that the commissions may have back of them wise laws, framed by men who intelligently comprehend the new and intricate problems which your development of the industry has raised.

Today one of the difficulties that the financial world encounters with public service commissions is on the ground of delay. Sometimes commissions fail to recognize the necessity for prompt action. Frequently they are so burdened and overladen with matters requiring their judgment that it takes months, or even runs into

years, before decisions are rendered. Those charged with the duty of financing public service corporations have perhaps more ground for just complaint over commission delays than against the character of decisions after they are made. The commissioners themselves may not be to blame for these delays. Not infrequently they are given an impossible task to perform. I believe if the public understood this, it would not be difficult to obtain laws which would permit the appointment of extra commissioners, or assistant commissioners, or in some manner to organize the work so that pressing public business might be promptly cared for.

For large financing, large single capital issues are desirable. Nothing in connection with the business is more obvious than that the tendency is toward large mechanical units, large corporations, and large issues of a single type of security. That all tends directly toward an absolute essential if we are to have a market for public utility securities as broad as the present market for railroad securities. There must be large issues, large enough to warrant the most careful investigation by issuing houses, large enough to make a market that investors can buy and sell in readily, and large enough so that there will be many minds centered on the operating facts back of that security, making the market price of the security represent the combined judgment of many investors, rather than merely the price placed on the security by an issuing house.

The investor wants large issues, but not at the price of over-capitalization. There has been much progress in the last few years in the direction of large issues, which has been brought about through the formation of holding companies that control a number of individual plants. In the creation of these holding companies there has frequently been a tendency toward over-capitalization, toward the building of one corporation on the junior securities of another, and even on the consolidation of holding companies, and the creation of another type of security still further away from a primary lien. That tendency should be halted. There is quite enough imagination inherent in the business itself, without letting the imagination of the promoter come into play in creating issues with remote liens.

The holding company theory, I believe, is admirable. It scatters the risk; it affords intelligent supervision and engineering; it makes possible the cheaper purchasing of supplies; it gives a broader market and therefore a lower cost of capital—but the relation of total capital to total income involves principles that a holding company can no more transgress with impunity than can the original corporation.

If the investor turns from these large considerations, involving the relation of the properties to public opinion and civic control, and the relation of capitalization to reproductive property values and to earnings, and looks at the technical side of the business in the present state of the development of the science, observes the outlook for broader uses, for more economical production, and the growing necessity of society for the product which you furnish, then indeed there will be seen ground for the most optimistic views.

As I look back on my boyhood days, I think perhaps the keenest hours of pleasure that I can remember were when I was deep in Jules Verne's *Twenty Thousand Leagues Under the Sea*, or *The Mysterious Island*. I have recently had a pleasure almost akin to that in studying the *Report of the Committee on Progress* of the National Electric Light Association. That report of the Committee on Progress comes as near being a true fairy tale as I know of in current literature. It makes me envious of you men who are engaged in a field that has in it such possibilities, such certainties, one may better say—for the report deals with accomplishments rather than expectations.

Diversity factors, off-peak loads, the concentration of central stations, the opening of new fields for use of energy, and the more complete filling of old ones, makes reading that fires one's imagination. The making of two blades of grass where one grew before becomes commonplace, by the side of your accomplishments in cheapening the production of electric current either by water-power conservation or central station consolidation. When you add to that the economies of diversified load, and open up the fields that low-priced current and off-peak loads make possible, you have created a business situation where there is as much need

and opportunity for sound imagination as has ever existed in business life,—imagination, not mere dreaming, but imagination that means the correlation and new application of known facts. Sound imagination here has unlimited play, and you need it all through your organization and down to every subordinate who comes in any real contact with the problem of development. As great rivers have affected population, or railroad trunk lines have defined development, so will your distributing lines, carrying cheap current, affect our future growth.

The nation owes the greatest credit to those among you who have had sound imagination, have seen clearly, and who are thus contributing in the largest measure toward a fuller realization of all the possibilities. The man who conceives and installs a thirty or a forty thousand horse power generator is as much entitled to honors at the hands of our government as the men who built the steamship *Imperator* were entitled to be decorated by their government.

You are selling one of the few commodities that has gone down in price, while the cost of nearly eveything else that enters into our life has gone up. I note that in seven years in which the cost of living is calculated as having advanced 37 per cent, the average cost of electricity has gone down 17 per cent. You are in the one line of business where the theory of consolidation seems to be fully accepted by every one who intelligently understands the factors. Elsewhere in business there is a tendency on the part of the public to break up large organizations, but in your field the monopolistic nature of the business is recognized and there is the strongest tendency toward consolidation, and you are demonstrating, in consolidation, the greatest economies.

I note that forty-nine central stations in Illinois have been closed up and that four are doing their work better. I read that four thousand central stations in New York State might better give way to forty, or even to ten. I see it demonstrated that what was originally your main business, the furnishing of electric light, is now but incidental, and I am told that the economies of diversified load are so large that the great steam railroads will undoubt-

edly be able to buy power from central stations having that diversified load factor, more cheaply than they can produce it from their own central stations, however large their requirements may become. The diversity of load factor which permits the serving of the countless needs of a great community from a central station, and which leads to organization on such a scale that the highest intelligence can be afforded for every detail of supervision and engineering, is the direction in which we are obviously and rightly moving.

An independent municipal lighting plant is either an indictment of the intelligence of the community where it is located, or a criticism of the management of the private companies. The government might as well undertake the organization of transportation lines solely for mail service as for a municipality to undertake economically to produce current solely for street lighting. Wherever that is being done, or is in contemplation, there is either a misunderstanding of the fundamental principles of the business by the voters, or gross mismanagement and shortsightedness on the part of the private companies that should be demonstrating their ability to furnish the current economically.

The interesting statistics of your business show far more rapid increase in gross earnings than is shown by the railroads of the country, great as that increase has been. What is still better, in the face of a rapidly decreasing price at which current is sold, net earnings show a greater percentage of increase than gross, while the tendency with railroads is distinctly in the opposite direction.

No phase of electrical statistics strikes me as being more interesting than the growth of the use of electric power in our industries. In ten years the horse power of electric motors in use increased from less than half a million to nearly five million, until today about a quarter of the primary power used in the industries of the United States is furnished by electric motors. The most casual study of that development indicates that as yet it is but getting well under way, and that there are as striking advances to be made in the next few years as have been made in the last half dozen.

Today a quarter of the total industrial power utilized in the

United States is electrical. I am told that competent authorities believe that fully eighty-five per cent of the total industrial power can eventually be economically taken over by central electrical power stations. This means an addition of more than ten million horse power with the present volume of industry, and an expenditure in central station construction of one billion eight hundred and seventy-five million dollars for the production of that amount of current.

Those of you who are close to and an intimate part of the astonishing development of the electrical business, find these, and a hundred other interesting facts that might be stated, but the commonplaces of your every-day business. They are such sound and substantial facts that you perhaps marvel that four out of every five investors in corporate securities have never bought an obligation of a public utility corporation. You can see how it is possible soon to be furnishing fifteen million instead of five million horse power to the industries of the country; you can see how it is inevitable that great central stations will produce current so cheaply that all the energy that is required for wide communities will soon be coming from single central stations.

On the other hand, I can see that if investors can be convinced that a public service corporation is not another name for a target against which to level unfair state and municipal enactments, we may have four out of five investors buying such securities, rather than refraining from doing so.

In the mind of the investor, the outlook for fair public treatment of public service corporations is the most important single factor in directing capital toward or away from the electrical field.

I firmly believe that this matter of fair public treatment lies largely in your own hands. If you will do as well with that as you are doing with the technical side of the business, the four hundred million dollars a year of fresh capital which you will need will be forthcoming.

THE PRINCIPLES OF RE-SALE CONTROL

By F. P. Fish

MR. CHAIRMAN AND GENTLEMEN, the subject which has been assigned to me—*The Principles of Re-Sale Control*—seems at first very narrow and almost technical. But upon reflection, you will see that it is related to the tendencies of the times, to what might be called the psychology of the day, and also to history in such a way as to make it really a large matter for consideration. I shall take the liberty of approaching the subject in a broad way, although before I get through I shall deal, as you probably expect me to do, with some of the details of the situation.

The movement hostile to re-sale control—that is, control of the price of articles after they have been sold by the manufacturer in order that there may be that fixed price to the consumer which the manufacturer desires to maintain—is part of the general movement of the day, hostile to business as now carried on, to which attention was called by Mr. Vanderlip, to which Mr. Doherty gave considerable thought last night, and which, among other things, has resulted in the admirable Commission, in Wisconsin, of which Mr. Roemer is a member. And this broad movement exemplifies a very definite and startling reaction from the condition of popular thought that existed not so very long ago which was definitely that of the people of this country and which was, to a large extent, responsible for the wonderful development of our industries during the last fifty years. We all know there was a time not many years ago when the ideal of the American people was industrial progress. They longed for it; they hoped for it; they worked for it. In every way they encouraged our industries and the men and the methods calculated to promote industrial development.

F. P. Fish

Let me recall a few things that were actually done in those days. In the first place—I am going back now only a generation or two—there was no spot in this country where the people were not wild for improved transportation facilities. The national government, the states, the counties and even the municipalities were eager to induce capitalists to invest their money in building steam and street railroads and establishing lines of steamers. Why? Because it was generally recognized that the most important problem we had was to develop this great country of ours, to make it prosperous, to enlarge its industries; and without adequate transportation systems such things could not be attained. When we come to individual enterprises, think of the extent to which they were encouraged! Not so many years ago, cities and towns all over the United States were willing to give land, to remit taxes for a number of years, even to advance capital, for the sake of bringing a new industry into their locality. In addition, out of local pride, individuals in a community were glad to help finance such new industries.

So much for the physical side of it. But more than that, legislators were inspired with the idea that it was part of their duty to respond to this public sentiment which required industrial expansion, with the result that everywhere legislation was enacted which helped and made easy the development of industrial enterprise, and such legislation received the cordial support of the community. Corporation laws which were not adapted to modern conditions and modern methods of doing business were everywhere liberalized. Only a few years ago the State of Massachusetts, whose corporation laws were of the old fashioned type, remodeled them that capital might be attracted to its industries to a greater extent than could have been the case under the laws as they existed. Everywhere communities were eager to grant liberal franchises to public service corporations, for the service they could give was needed and needed immediately. Our national tariff system was popular throughout nearly the entire country because it was supposed that a protective tariff helped to develop our industries.

But outside of those definite and specific things, which played

so great a part in this matter and which co-operated to insure our industrial growth, there was a general feeling in the community that the promotion of industries was the great ideal. There was an atmosphere distinctly favorable to commercial and business expansion and to the men and methods promoting such development. People, individually and as a whole, recognized that there was no man more entitled to public esteem than he who was able to develop industries by way of either invention, initiative, organization, business capacity or administrative ability. Everywhere throughout this country captains of industry were recognized as leaders, as benefactors, as admirable citizens.

A new situation developed under those conditions with extraordinary rapidity and the ideals of the community were largely realized. In the history of the world there was never such a period of material progress and industrial expansion as that of the last fifty years, and in no part of the world has the development been so wonderful as in this country, where the community was right behind the movement from start to finish.

Whatever defects there were in the new condition of things—and Heaven knows that there were many—they were ignored, neglected, overlooked, because the results were so great that any incidental blemishes were not regarded as worthy of criticism or of notice. I have no doubt that a philosopher, studying the situation, might well say the public went too far in regarding material progress as the great end and aim of our activities; that our people were too liberal in aiding industrial expansion; that they were too free with their gifts of franchises; that they were too generous in their new corporation laws and in their encouragement of commercial industry. After the event, it is possible to make a great many criticisms; but the fact remains that the situation so created and the stages and methods of its creation were eminently satisfactory to the American people.

We know the stress and storm of that development, the difficulties encountered, the tasks accomplished, the results achieved. We know how problem after problem was attacked and solved. We know of the great inventions that were made, of the great

enterprises established, of the new arts created and carried almost to perfection, and of the increased production and reduction in cost that have been attained. We know there has been developed in this country extraordinary administrative ability—extraordinary business capacity, resulting in most effective schemes of organization, in efficient factory and distributing methods, in marvellous improvements in transportation, in the adaptation of banking and financial principles to complicated conditions such as never existed before, all of which revolutionary development on new lines was necessary to enable this wonderful growth to be initiated and carried on. And we succeeded in attaining the results to which we aspired. The triumph is one that we should be proud of. Future generations will undoubtedly look back on the last half of the nineteenth century as one of the most wonderful periods of intellectual activity that the world has ever seen. There may have been a sordid side to it but, fundamentally, it was real intellectual activity of a high order which characterized our work and was responsible for our great achievements.

Our vast accomplishments were based upon intellectual effort, upon imagination, upon character, upon mental strength, just as much as in other times were the triumphs of man in other directions, as, for instance, in literature, in art and other lines of human effort where we of our time are not pre-eminent, because those in our generation, who in a previous age would have exercised their great intellectual and imaginative powers in different fields, have, by the laws of humanity, found themselves in such sympathy with the tendencies of today that they have applied those powers to industrial development and the scientific research which underlies it instead of to such subject matters as were closest to the heart of other generations.

But of course, while we were revolutionizing industry, putting commerce on a new basis, bringing the whole world together by steam and electricity, reorganizing our factories and our methods of distribution, and correlating our banking and financial methods to new conditions, we, individually, and our whole social and business organization, were under a strain; and as is always the

case in a period of stress and storm, great and sound as was the achievement, evils developed due to the inherent difficulties involved in a process of readjustment to radically new conditions. The time came when the public began to notice those evils, and as is the habit of the public, just as soon as that time came, we, the people, began to be unreasonable in our attitude toward the very conditions which we had admired and which we had ourselves longed for and promoted and which without our co-operation never would have been developed.

Our pride in our industrial progress has largely changed to bitter hostility. We have and enjoy the great results of the work of the past fifty years, but ignore all that and brood over the evils that have come as an incident to those results. This is neither fair nor reasonable. We should recognize the truth. We should never forget for a moment what we have gained. We should study the situation, not with the view of destroying the good with the evil, but of correcting what is bad in such a way as to save what is good. Unfortunately, this is not the way people act. They go from one extreme to the other, and at the present time, encouraged by selfish politicians, self-seeking writers in newspapers and magazines and certain students of books and not of life, who fail to see things as they are, they threaten to destroy the great fabric of our industrial development because of certain incidental evils which could surely be corrected by time, thought and patience without impairing the fundamental principles upon which our national prosperity is based. It would be as wise to tear down the capitol at Washington that we might get rid of the rats and cockroaches in it as to destroy the underlying structure of our business that faults may be corrected.

I sometimes think that the real reason for this change in public sentiment, which seems to me so serious a menace to our well-being, is largely based on what might almost be called an accident of the situation. Under the conditions which characterized our campaign of industrial progress, while we were reorganizing our methods of production and distribution and subduing the forces of nature to the service of man, not merely step by step—but

very rapidly and to such an extent as never before, there were great opportunities for individuals to acquire wealth, opportunities such as never before had existed and such as, in my opinion, will never exist again so long as the world lasts. The result was that in some conspicuous instances individual men acquired enormous wealth. These men did not always know how to use their wealth. Why should they? They had not had time to learn. They could not be expected to understand at once that the obligations imposed upon those who have great wealth are greater even than the privileges and the power that come with it.

But the accident that so many become so very rich, richer perhaps than any man ought to be in this world (I am inclined to think that that is true), appealed to the imagination of the very many of us who had not succeeded to our entire satisfaction and made us hostile not only to the men but also to the system and the conditions under which individuals had become so rich. It is too bad that an accident of this sort, which is really of insignificant importance and the evils of which are sure to disappear, should be the basis of an unreasoning hostility to business as it has been automatically developed in accordance with laws which no man established and which could not exist in its present forms if those forms were not, in substance, better fitted than any others for the conditions of today.

But whatever the cause may be, we all know the present public attitude towards our business methods and business organization and how it is reflected in the legislatures and in the courts. We all know the talk of the politicians, of the newspapers and the magazines. I will go no further with such general considerations. They are only material as illustrating the general situation of which the matter I am particularly to discuss is a part.

One form of expression of the dissatisfaction with conditions which not so very long ago seemed wholly admirable, has been an abnormal tenderness for what is regarded as the interests of the individual consumer. People have turned from the broad problem of the general development of the industries and of national prosperity to consider the individual man, particularly

the individual small man—to use a phrase which is intelligible although not very happy. There has been a feeling that his interests must be protected; that the larger man not only can take care of himself, but that he is likely to be guilty of injustice and harshness towards the smaller man; and that the community must rally to the support of the relatively insignificant consumer who has no money to waste and who, therefore, should be protected in the expenditure of what money he has by the certainty of getting the goods he buys at the lowest price. There is no doubt he should be protected against injustice and wrong, but I think the feeling has grown to such an extent that, if further developed so as to be made effective by legislation, the interests of the community and particularly the interests of the very members of our society whom it is thought to protect, may be severely harmed. While it is important that the individual consumer should get proper value for the money he spends, I am firmly convinced there are many things more important to our society as a whole and to each individual in particular than undue favoritism to the individual purchaser. The question of national prosperity is not bound up in the single proposition of whether or not the individual gets the goods that he buys at the cheapest possible money price. It would be quite consistent with his being able to buy very cheaply that, partly because of that very circumstance, our industries should be so demoralized that the man would not have the money with which to buy. I believe the prime interest of every one of us is that, as a whole, we should be prosperous, and what each one of us is required to pay for the commodities he buys is not the sole test of universal prosperity. Other things must be taken into account.

More than that, it seems to be forgotten sometimes that one of the obligations which each consumer owes to himself is to be reasonable and careful in his expenditures. It is not necessary for him to buy a thing if he does n't want it or can not afford it. It is sometimes wise for him to refrain on the basis of that old fashioned thrift which has been of such value in the industrial and social history of the world. There are many points of view

from which I think it is safe to say that other things should be considered besides the mere cheapness, in money, of an article to the consumer. We must take a broad view of the entire situation, and while the cheapness of the article to the consumer is important, it may well be that it is equally important that he should not get what he wants at an unfairly low price. The business of the community can not be in proper condition unless, in general, there is profit to those engaged in enterprise. Unless there is such profit, wages and salaries will not be good and some will not find employment. A business situation in which the consumer, in other than exceptional cases, got what he wanted at less than cost with a fair profit added, would be deplorable; and it would be the man of small means who would suffer most, for he might not be able to get the wherewithal to buy at all.

The laws under which we live have always recognized that the consumer should be protected against oppressive acts on the part of those who, by accident or superior intelligence, have the opportunity to take advantage of his necessities. Unreasonable restraint of trade by agreement of producers or otherwise, resulting in unreasonable prices to the consumer, has for hundreds of years been forbidden by the common law. There is no question as to the wisdom of such laws when intelligently applied. It is a very different proposition, however, when like laws are suggested, the consequences of which will be to prevent the producer or middleman, if there is one, from getting a fair return out of his business, and when so developed, laws as to restraint of trade become arbitrary, unjust and most hurtful to the community as a whole and to every portion of it. In the long run, the small consumer will be the one to suffer most under those conditions.

One of the unfortunate features of modern business, which has inevitably come with the development of the conditions of our day, has been cut-throat competition. There is no doubt whatever in my mind that the old doctrine that "competition is the life of trade," while sound when applied to the conditions of the day in which the phrase became a proverb or folk saying, is no longer altogether true in view of our present conditions. Today, looking

at the matter from the standpoint of national prosperity in which the prosperity of the individual is so intimately interwoven, I think it would be safer to say that much competition which is possible and of a kind which frequently comes in modern industries, is not the "life of trade" at all, but the destruction of trade. Such competition in its destructive form has arisen largely because today there is absolutely nowhere any barrier or check to competition such as existed up to recent times. Every one today can freely compete with every one else all over the country. The old conditions where a man had a certain advantage in his own locality are largely gone. Modern methods of transportation have brought all localities closely together. A manufacturer today does not select the place where he will establish his plant with much regard to the market. He selects his location for other reasons—accessibility to raw materials or satisfactory labor conditions—and from the point selected he competes everywhere. More than that, there is a principle which is not new but which has been developed to such an extent that it has a new significance, which plays a part in this situation, and that is the generally recognized modern idea that the more goods a man makes, the cheaper is his cost per unit. There is no doubt but that that proposition is sound and that it is at the basis of modern manufacturing; so that all through this great land under the stimulus of public sentiment and in view of the conditions that were developed so rapidly and satisfactorily, every manufacturer has been and is now inclined to say to himself: "If I can only double my product, I will get my cost down so that I can undersell my competitors." And he starts in to double his product; and how? There is only one way to do it and that is to cut prices. Now if one or two of a hundred competitors started on such a campaign, they might get the advantage they seek. But all of them have the same idea and start in to work it out at the same time. The consequence must necessarily be destructive competition as a result of which none of them prospers.

From these conditions to a very large extent have grown the great corporations, the great combinations which seemed

an inevitable necessity to meet the evils of destructive and unreasonable competition. From our short experience, for we have had only a few years in which to meet this new and serious difficulty, it seemed that the only way in which we could eliminate destructive competition was by bringing the competitors together. Here again evils have followed in the train of a perfectly legitimate effort. Moreover, destructive competition still continues and seriously affects our national prosperity and the prosperity of the individual. In time we shall find out the way in which to meet the difficulty. I am sure that it can not be met adequately by laws or legislation. It will be overcome, if at all, by the intelligence and commonsense of business men acting spontaneously and almost automatically under the influence of the controlling necessities of business, which will lead to social and business laws adapted to the conditions, and self enforcing because their validity will be instinctively recognized. Laws passed by Congress are not at all of this character and are likely to fail because artificial in character, based on theoretical and academic considerations, and only to be enforced arbitrarily and not spontaneously.

When we come to protect the consumer by artificial requirements or prohibitions not based on the instinctive give-and-take of free commercial transactions, we are undertaking a large job. In the old condition of things of a generation ago, it was generally recognized that one of the features of business which was entirely under the control of the man who had goods to sell was finding out good ways of selling, good ways of making a market for his goods. The law recognized the clear right of each producer or distributor to exercise his ingenuity in this matter to the utmost, of course within the limits of fair and honest dealing. Public sentiment was squarely behind this principle. And the law and public sentiment seem to me to have been clearly right in the matter, for if the innumerable products that are new and the even greater number that have been much improved are of use to the community, as is generally the case, it may well be regarded as in the interest of the community that they should be disseminated and that the consumers should both want them and

be able to get them; and if they wanted them and took them the individual was benefited and, of course, industrial development and the industries generally were promoted. Even in the case of staple goods, every one regarded it as legitimate and in the public interest that each man should find new ways to increase his business by opening new fields or getting a new class of customers. So we have had in the last fifty years, as always before, a vast number of experiments as to how to make and how to hold a market. The success of an enterprise largely depended on skill and ingenuity in this regard.

If we compare the advertising methods of today with those of fifty years ago, we will see one field in which there has been almost a revolution. I am not at all sure that a sound philosophy will justify all the advertising methods of today, but that is a question I do not propose to discuss. Most of them are here to stay and there will be new ones. They play a very large part in our industrial activities and methods.

We have today, as an accepted part of our business machinery, not only the jobber and the retailer in relations which of themselves are fairly old, although we do not have to go back very far to find their beginnings, but we have also the department stores, which are a relatively new thing, where men of intelligence and almost of genius have shown that it was an economy to deal in an infinite number of articles, generally selling them at a very small profit and relying upon the bulk of their sales and occasional transactions in which the profit is great, for the large return which they are to get for their enterprise. It is absolutely essential that they should get right at the people and attract them in numbers to their store in order that their goods may be sold quickly. The mail order houses have also come as a new feature of our times. It is not necessary for me to describe their methods. We all know what a revolution they have already made in business, and it looks to me as if in the future they might go still further and possibly very seriously affect the old fashioned retailers of the United States whose business is already depressed by the department stores. They may eliminate many of them ultimately. All these

agencies are a part of the situation and it is in view of them all that a man has to make a market.

As to methods of marketing staple articles, foodstuffs and clothing, for example, we have had thousands of years of experience. Other familiar products that have not been sold in such large quantities or to so many people are so analogous to staple articles from the point of view of satisfactory distribution, that the old methods are applicable and there is no trouble with them whatever. They are generally sold in ways with which the public is familiar and perhaps there has not been of recent years any striking general change in the methods of their sale. It is not with these classes of goods, which probably in money value make the bulk of our commodities, that we see much advertising and it is not at all with these classes of goods that there has been any substantial question of the control of the re-sale price. But the control of the re-sale price has come to the front with the large number of articles which are sometimes called specialties; that is, for the most part, things that are new or in new demand which a man does not have to have, but which, when brought to his attention, he is very apt to want because of their merit or the skill with which they are urged upon him. It is only when he is educated to want them that he will go out and buy them.

For instance, the Waterman pen is a patented specialty. So is the Big Ben Clock, the phonograph, the Ingersoll watch, many forms of suspenders and garment supporters and hundreds of other articles.

Consider for a moment the problem before a man who has developed one of these specialties, very often with a great expenditure of brains, a most creditable exercise of the imagination and the investment of time and money, all on the chance that the article finds a market. What is his situation? He has no market, because the thing is new and a specialty; the public does n't know about it. The manufacturer has no wide field open to him, as is the case with staple and analogous goods. Very likely there is an opening for the new thing only as a substitute for something else. Frequently, although a brilliant patented invention may be

involved, to find a market may require more ingenuity and skill than the getting up of the device. To meet all these difficult conditions, men who have undertaken to manufacture such articles have in many cases found that it was absolutely essential for their success that they should control the re-sale price. Just what does that mean?

I have in mind the case of a certain article that I know about, but the name of which I shall not mention. I have heard the story in this way. The inventor had no capital. He borrowed $2,500, and started in to build his device, which was a very good one. By his intelligence and skill as a manufacturer, by his honesty and care as a merchant, and by his intelligence and skill as a salesman and chiefly by getting up a scheme of distribution which was attractive and which involved control of the re-sale price, he has today built up a very large business. He has received a reward for his effort which no one begrudges him, because the goods are first rate and many people want them and have profited by his skill and experience as inventor, manufacturer and salesman. At the beginning no one knew his article. There was no demand for it. He had no capital or facilities for pushing it. What was he to do? He could not introduce his device or even start a market for it by simply offering it to retailers in the ordinary way. They would not take it. They were sure there would be no demand for it. To get and hold the market two things were necessary, a popular demand and retailers everywhere, whose interest was enlisted to supply the demand. Judicious advertising would attract the public's attention, but nothing would be accomplished unless the goods were everywhere accessible to would-be buyers. This man advertised to the small extent justified by his limited means. But he had to get the retailers on his side. If they were not interested in the sale of that article (none of them could ever hope to sell many in the course of a year), they would refuse to handle it even if the public wanted it, and would use all their influence to shift the public over to some competing product. Each must see an assured profit in the small number of sales, that he could expect to make. This important result could be secured only by control-

ling the price to the consumer. Everybody knew that if any one who got title to some of the goods could sell at any price he chose, one man in the city of Chicago could buy a gross or half a gross of this article at the regular price from the manufacturer, from a jobber or from another retailer, and could then advertise in the Chicago papers that he was selling those goods at, say, cost or a small profit above cost. Immediately the business would absolutely fall flat in all the other retail stores, for customers who had seen or heard of the advertisement would say that the price there was too high, and the retailers, finding the market demoralized, would simply say: "Well, we are only making a few dollars a year out of this little article. We will drop it and turn our attention to things that will pay us a fair profit. We will not invest in a thing from which we can not get a fair return. We will send these articles back and not keep them in our store at all." This sort of thing has happened hundreds of times.

I was very much interested when the Sanatogen case was on in Washington to find that the man who was cutting the price of Sanatogen and was sued for it was also cutting the price in many other specialties. And the business of one of the most prominent specialists in this country which before had been extremely good in Washington, was absolutely killed by the fact that this one man, O'Donnell, who was the defendant in the Sanatogen case, advertised that specialty at a cut price just as he advertised Sanatogen and other things. It is easy enough to see how human nature works. A man wants to buy a Gillette safety razor and he knows that the price is five dollars, but having seen it advertised as sold at the cut price store for three dollars and a half, will he go to his regular dealer and say, "I want a Gillette razor"? He might first do that, but when he is told that the price is five dollars, he will say, "Oh, no; I can buy it for three dollars and a half at other stores which so advertise." His dealer can not sell at that price, for he is an honest man who keeps his contracts, and at five dollars his profit is not excessive. Moreover, his sales are so small that it is not worth while for him to bother to keep the goods if he is not sure of a reasonable profit.

If the customer goes to the cut price store, very likely the clerk says to him: "I am sorry but we have had such a run on those articles that they are all sold out, but here is another make of safety razor which is a good deal better and which I can sell you for three dollars"; and he tries to work off that razor on which he makes a real profit, at the same time looking perhaps for more Gillette razors that he may use them further as a leader. Moreover, the cut price dealer having brought the new customer into his store is very likely to sell him some other article before he goes out.

Some retailers and many department stores will do exactly that sort of thing. And if they do it in that way, one such dealer can kill all the business in the specialty for the whole territory that is reached by his advertisement. The other dealers finding that they are not protected in their standard profit as they expected will refuse to handle the goods. A single such cut price advertisement by a man who has no articles or a dozen may cut the manufacturer out of the sale of thousands and ruin his business.

Going back to the case which I started to use as an illustration, but from which I have drifted, the manufacturer shrewdly advertised and established good relations with retailers. Everywhere he controlled the price to the consumer by contract and the terms of the license to sell and use, granted as part of the sale of each article, so as to interest retailers in the goods. The result was the development of a magnificent article which is regarded everywhere in this country as the best of its kind. The career of this inventor and manufacturer was creditable to him and of great value to the public. If he had not controlled the price to the consumer, he very likely would have failed to make any market and the public would not have had the benefit of his contribution to its well-being. If he can no longer control the re-sale price, his business even now may be ruined and the public deprived of his goods.

It is obvious that there are like reasons why, in many cases, the re-sale prices of the jobbers must be controlled.

Now let us see exactly what is meant by control of the re-sale

price. In the old days, fifty, seventy-five or one hundred years ago, a producer generally acted as his own jobber and his own retailer. He sold to his neighbors almost altogether because no one could come to him except his neighbors. Difficulties of transportation forced those near him to buy of him and largely prevented his selling at a distance. He charged the consumer exactly what he pleased. If he wanted to sell a jackknife to a neighbor for fifty or seventy-five cents, that was the price and he had a perfect right to insist upon that price; and if he was an honest man and was trading upon a sound basis, his price might well be uniform to all consumers and the consumers had to pay it. He had that right then and he has that right today. If he sold to retailers or the small shops that stood for our retailers, they were largely isolated, each dealing in his own territory in his own way, and none being able to affect the trade at points a few miles removed from his own shop. The days of destructive competition had not come.

The maker of the article which I have used as an illustration has the same right today that was enjoyed by his predecessor of one hundred years ago. If modern methods of distribution would permit it, he could today sell to the individual consumers of his goods in the United States at the fixed price which he has established, and the law would not only be absolutely satisfied but public sentiment would commend his course; for there is a feeling in the community inconsistent with hostility to price control, that a man should have a standard price for his goods and should adhere to it, except that in most cases a purchaser would be pleased with a cut price to himself. If they had the capital and it was feasible, the manufacturers of specialties could start a shop in every city in the United States and each could sell his article to consumers at a fixed price and no less. Thus they would maintain their standard price and absolutely control the price to the ultimate purchaser. The law would be satisfied and public sentiment would approve of that course. But manufacturers can not do that. They can not reach all the consumers in a country of ninety million people, extending from the Atlantic to the Pacific and from Canada to Mexico. They can not have stores in every town. They

must make use of the ordinary normal business methods of the day in order to sell their goods. The question which the specialty manufacturers had to face was how, under modern conditions, could they maintain a standard price to the consumer with whom they had a right to maintain a standard price and to whom, if they could get at him directly, they would sell only at the standard price, all strictly according to the rules of law. How could they maintain a standard price all over this great land and yet have satisfactory distributing agencies? There was clearly only one way and that was to say to the retailers and jobbers: "The consumer must pay our standard price. There is only one way in which that can be assured and that is for you, the jobber, to insist upon a fair price which will give you a fair return and for you, the retailer, to do the same, the margin between the price at which the retailer sells and the price at which he buys from the jobber being such as to give the retailer a fair return. I, the manufacturer, will fix the re-sale prices for both of you, jobber and retailer, so that each one of these absolutely essential agents of distribution will get proper pay for his services and the consumer ultimately will pay a fixed price, the result of this arrangement being that it will be more difficult for cut-throat competition absolutely to ruin the business of the manufacturer."

I must say, gentlemen, with all deference to that public sentiment which is opposed to the maintenance of the re-sale price system of distribution, with all deference to the views of the politicians, the newspapers and magazine writers who take the contrary view, and, I may add, with all deference to the views of the courts as to the law, that I absolutely fail to see where there can be any criticism whatever as to the honesty, the fairness, the reasonableness and the rightfulness of the position of the specialty manufacturer who, for adequate reasons, insists upon controlling prices until ultimately the consumer pays the uniform price which the manufacturer insists he shall pay. And I am not talking at this moment merely of patented things, for it seems to me that any man who makes a specialty as distinguished from a staple article should have the same right if he can enforce it.

There is but little reason to believe that any "oppression" of the consumer has resulted or ever will result from the practise. No consumer need buy the article. He would not buy it at the price asked unless it were worth the money to him.

Now to turn to history for a moment, for history throws light on all these modern business developments as well as on the real basis of many legal principles. Sometimes those who made history would be very much astonished if they could know what has been the distortion of their original sound ideas. Here, for example, is one historical point which is interesting. The Sherman anti-trust law is in fact a law to check restraint of trade. It is based upon history. We may go back as far as we choose in English law and we find this simple, commonsense proposition; that the public was entitled to the benefit of a man's skill and capacity; that if a man had a trade or knew an art, it was to the interest of the community that he should work at that trade or in that art; and therefore the old law provided among other things that if a man, whether a tradesman or a craftsman, sold out his establishment to another, the sale carrying with it the good-will of that establishment, the purchaser was entitled to protection against the immediate competition of the seller because it would not be fair for the seller to deprive the purchaser of the value of the good-will which he had bought and paid for. Contracts that the seller should not compete with the purchaser so as to make of no value the good-will which the latter bought were perfectly valid in law. But it was equally clear that the purchaser should not have any protection except that which was necessary to secure to him the value of the good-will. So in the old English law a covenant by which a man who sold out to another agreed not again to carry on a trade or business of the same general character as that which he had sold, was invalid except to the extent necessary to protect the purchaser of the good-will in a reasonable way. The seller could be bound by a covenant to stay out of that business only for such limited territory and for such a limited time as was required to make his sale of the good-will of his old business effective. That is, if he was a blacksmith in

Coventry, a contract to stay out of the blacksmith business in Coventry, for five years would have been perfectly good. An agreement to stay out of the blacksmith business in England for thirty years would have been bad. And by a logical process of development, as modern business began to expand, the courts applying the word " reasonable " and giving it a proper meaning held, among other things, and not so many years ago, that a man who was selling wine and who sold out to somebody else his business and good-will and made a contract that he would not engage in the business of selling wine for twenty years in any part of Europe, was making a " reasonable " contract to which he would be held. And why? Because under modern conditions he could hurt his purchaser just as much by going into business anywhere in Europe and selling wine, as he could five hundred years ago if he sold out a blacksmith shop in Coventry and immediately started a new shop and competed with his vendee in Coventry. That is the old common law to which the Courts have now definitely attached the principles of the Sherman anti-trust law and to which they have referred in developing the meaning of that law. I have sometimes wondered what Lord Coke, Lord Middleton, Lord Bacon or Sir Matthew Hale would say if they could come here for a moment, as they undoubtedly would be glad to do, and see what has been developed from that very plain, simple, wholesome proposition of theirs, which was devised to meet the conditions of an age when one could not get oneself or one's work from one town to another except by walking or by animal power. That is one striking illustration of the way the present day is related to the old times, not only as to social and business conditions, but in legal principles.

But to return to the re-sale price. Under those early conditions the judges made most of the law by working from one precedent or decided case to another. Practically Parliament has never interfered much by way of making new laws affecting business or business methods. The British Parliament in a century does not pass as many laws affecting business as one of our states will pass in a single legislative session. In the old days the judges, looking at

the matter as one of common sense, decided that, generally speaking, a condition such as a price restriction could not be attached to an ordinary chattel or piece of personal property by the seller. It seemed to them unnecessary and absurd that the title to an article which might pass from hand to hand should be uncertain. If such a cloud on the title were permitted, no one would be safe in buying any article. In the simple transactions which characterized the time when this principle of law was enunciated, any other conclusion would have been unreasonable. Nothing of the sort was needed to protect the seller of any class of goods then in the market. Conditions are very different today. Business can not be done in the simple fashion of three hundred years ago. I myself believe that our courts might properly have taken an entirely different view of the law when they came to deal with modern specialties, where the market has to be built up by the intelligence and skill of the manufacturer, and where he has to devise ways and means adapted to get his goods before ninety million people in such a way as to give him a chance of profit and the public the benefit of products which it would like to have. I do not think that there was any legal principle based upon the old authorities which compelled the courts to prevent a man from using the machinery of modern distribution in such a way as to get from the customer that fixed price which, if the conditions were simple, he could get by himself dealing directly with the consumer. And a good many of the courts, including our Supreme Court in Massachusetts, took just that view.

It happened very unfortunately that many of the cases that came up for consideration in this connection were patent medicine cases. I have no sympathy with patent medicines or patent medicine manufacturers or with the use by the public of patent medicines; and it is just possible that a most unfortunate element in this situation, leading to what I can not help feeling is a harsh and unreasonable view of the rights of manufacturers to protect their interests by controlling the re-sale price, is the feeling which the courts must have (if they feel as I do) against patent medicines. However that may be, the Supreme Court of the United

States has held that the men who made a patent medicine had no right to say to the public: "You can not get a bottle of my medicine for less than fifty cents," using the machinery of modern times to enforce that proposition in the only way in which it could be enforced, namely, by proper contracts with jobbers and retailers to fix the re-sale price. In deciding the case as to a patent medicine, it established the same rule of law for all articles whether specialties or not, although even after that decision a different rule might well have been adopted as to articles covered by patents because of the nature of the patent monopoly.

In coming to its conclusion, the Supreme Court was undoubtedly influenced by what it regarded as public sentiment and the current views of public policy. That court and all courts must necessarily take into account a prevailing public attitude when they come to deal with large social questions as to which a public sentiment has been excited; otherwise they would find it hard to maintain their position as a dominating factor in our society, which position must be maintained by the courts if our social organization is to endure. In the Miles Medical Company case, where this point was first decided, the Supreme Court took pains to say that it did not decide whether there was or was not the right to control the re-sale price of a patented article; it left that question open.

The consequence of the decision to the Miles Medical Company was not very serious, because the Miles Medical Company immediately organized an agency system by which it got the same result as before, by retaining title to the goods and appointing agents to sell in its name in different localities. By that scheme the Miles Medical Company secured exactly the result attained by their former method, namely, a fixed price to the consumer, by introducing the complicated and troublesome machinery of retaining the title to the goods until they actually reached the consumer, just as they would retain the title until the goods reached the consumer if all sales at retail were from a store actually owned and run by the manufacturer. Formerly they got the result by business machinery which the court said was unlawful. By their new plan they got the same result by a method which was clearly within

the law. That is all that happened as the direct consequence of the decision in the Miles Medical Company case. The manufacturer still fixes the price to the consumer, but he has had to adopt a more troublesome and unsatisfactory method.

Later the Supreme Court applied the same rule of law to a copyrighted book, holding that there was nothing in the copyright statute that justified a control by the manufacturer of the re-sale price of a copyrighted book. Again the Court declined to say whether the same ruling would apply in the case of an article covered by letters patent.

There was still left undecided the question whether or not the manufacturer of a patented article did not, in spite of the Miles Medical Company case and the copyright case, have the right to fix the price of the patented articles sold by him, because of the very nature of the monopoly secured to him by the terms of his patent. There was a long line of decisions of the United States Circuit Courts of Appeal and Circuit Courts to the effect that the patentee had this right. The courts of England had affirmed the same doctrine. It seemed as if decisions of the Supreme Court itself involved this proposition as a necessary conclusion.

The constitution and laws of the United States, that the useful arts may be promoted, confer upon the inventor for a limited time the "exclusive right to make, use and sell his invention." The word "exclusive" appears in the constitution and in the patent statutes. The courts had universally given to that word the plain ordinary meaning with which it would naturally be associated. They had held that the exclusive right to make, use and sell which is vested in the patentee by the terms of every patent means that if he has developed a new invention, which the world would not have had except for him, he may control it absolutely for the statutory term of seventeen years; that he may use it or not as he pleases; that he may sell the whole or any part of his rights; that he may authorize others to make use or sell the invention upon terms fixed by him; and that he may establish conditions upon which any one may manufacture or sell or use it. The Supreme Court itself has said that any such

conditions would be enforced "unless definitely unlawful." After seventeen years the right to make, use and sell the invention belongs absolutely to the public for all time. During that period no one has any right to it except upon terms imposed in each case by the patentee. Assuming, as the Supreme Court itself has so many times said, that the right of the patentee is absolute, it would seem that among those absolute rights was that of fixing the price at which a user could have the benefit of the invention, even if, in the case of an unpatented article, it were contrary to public policy that the manufacturer should have the power to fix the price to the consumer. It would seem as if the very principle of monopoly upon which the patent law was based gave exactly this right to the patentee.

It is to be noted that this exclusive right for a brief term is all that a patentee or those who devote time, energy, business skill and money necessary to introduce the invention into use get for the invention. This, their only reward, is clearly the best and fairest that can be given. It comes automatically. If the invention meets a public need, it will go into extensive use and the compensation to the inventor, the organizer and the capitalist, who have backed the invention and made it a success, will be in proportion to the extent of its use. If, as is so often the case, the invention fails because it does not meet a public need or is ahead of the time, the patentee and those associated with him get nothing.

As a matter of fact, the failure of inventors to succeed is so frequent and the losses of those who undertake to introduce inventions so great that many competent to judge believe there is more lost than gained in such enterprises, as is said to be the case with mining operations.

There is no question whatever as to the advantage to the public of our patent system which has made us a nation of inventors and increased our productive capacity to such an extent that in the face of many disadvantages, particularly the high cost and growing unproductiveness of labor, we have been able to hold our own in competition with the world by constant improvements in machinery and methods of production.

Even if it be law that one who makes a non-patented article has not the right to control its use by fixing the terms upon which one may use it and the price to be paid by the user, it would seem clear that the patentee who has from the specific language of his grant and the express provisions of law, the exclusive right to use his invention, could lawfully impose conditions upon a user so that he could, by proper contracts and business arrangements, determine the price which the user should pay for the right to use. It would seem as if the lower courts of the United States, which have decided this question so many times and always in favor of the patentee's right, were justified in their views. For it was apparently a settled law that a man who had made an invention and started its manufacture alone or in association with others could control the price at which the article should be sold by the jobber or by the retailer to the consumer, because he had by the terms of the statute the *exclusive* right to sell and the *exclusive* right to use, which language conferred upon him the right to fix the terms, price for example, upon which another may sell or use.

But the Supreme Court has recently (in the Sanatogen case) decided to the contrary.

In that case again it was unfortunate that the article happened to be a patent medicine and one which, judging from the advertisements of it, was offensive and demoralizing as are most articles of its class.

The conclusion of the court was that of a bare majority, five judges to four. The grounds of the decision were that the patentee in that case (and the same is true of most re-sale cases)had received in the first sale to the jobber or retailer the *entire compensation* which he demanded for the patented article, including the right to use and resell it, and that therefore, when sold and full compensation had been received, it was freed from the monopoly of the patent and no longer affected by any considerations based upon the patent law or on rights under patents.

Having advanced this proposition, it followed, of course, that the patented article could not be treated differently from the

unpatented product of the Miles Medical Company or the copyrighted book.

I regard this decision as most unfortunate. It seems to me perfectly clear that the court need not have decided the case in this way, but could properly and logically have accepted the views of the many lower courts which have sustained the patentee's right to fix prices as part of a plan for marketing his patented article.

The court was undoubtedly, and properly, influenced by public sentiment and the inclination of legislators to look after what is supposed to be the interest of the individual consumer. It may have felt that to have confirmed the patentee's right to fix re-sale prices would lead to hostile action against the patent system to the support of which the Supreme Court has always been definitely committed. I can not help thinking, however, that the interests of the individual consumer throughout this country will, in the long run, suffer from rather than be promoted by this new doctrine. Enterprises based on patents, which in any event have a hard enough time, will be still further embarrassed, many good things will never get to the public at all and the people will therefore, without realizing it, be deprived of many products which would have added to their comfort, convenience or productive capacity.

It is just possible that the court was not fully informed as to the very serious consequence of its decision on enterprises now existing or which may or might otherwise have been hereafter established. The court may not have realized the large number of industries based upon patented specialties which are likely to go to the wall if the re-sale price can not be fixed, and the throttling of new industries that may follow if the re-sale price can not be controlled.

It undoubtedly appreciated that agency schemes could be devised to accomplish the same result, the manufacturer or the patentee keeping title until the patented goods finally reached the consumer, but it may not have realized the very great complexity, difficulty and expense of such agency systems.

While this decision must stand as the law of the land, I am not

at all sure but that the time will come when the right to fix the re-sale price of patented and perhaps other specialties will be definitely established by affirmative legislation.

The Sanatogen case has an interesting relation to a prior case in the Supreme Court. A year or two ago that court decided the case of Dick vs. Henry in which there was a sale of a mimeograph, which was patented, with the condition that that mimeograph could be used only with stencil paper and ink purchased from Dick, the patentee and the manufacturer of the device. Dick sold the mimeograph at no profit and expected to get his compensation for the use of his invention and as a manufacturer, from the sale of supplies to the user. In that case the validity of the condition, which we see was a real condition but no different in principle from the condition in the Sanatogen case, that no one could use the article unless he had paid a certain price, was sustained by the Supreme Court. To the outsider it almost looks as if the Sanatogen case overruled the Dick case; but the Supreme Court in the Sanatogen opinion expressly affirms the Dick case on the ground apparently which has already been stated that Dick had not received his full compensation at the time of the sale.

As the law now stands, the only situation under which a condition (not definitely unlawful) imposed upon a user in the sale of a patented article is invalid, is where the patentee has sold the article and has received the entire return that he expects to get. In the Dick case the owner of the patent expected to get a further return by selling the stencil paper and ink for use on the mimeograph. In the Sanatogen case he had sold his goods for, say, forty cents a bottle with the agreement or restricted license that the retailer should sell it for fifty cents, thus controlling the price at which a user could get the goods. The court held that that was a condition which could not be enforced, although shortly before it had decided that Dick's condition could be enforced.

With all deference to the greatest judicial tribunal that ever existed, whose record for learning, patriotism and the sound administration of the law should be the pride of every American as it is the admiration of the world, I can not help feeling that the

court in the Sanatogen case overlooked some of the salient points of the situation. For the patentee, it said, had received all that he expected to get from the sale of a bottle of Sanatogen when he himself sold it. He had no pecuniary interest, said the court, in the price charged by his vendee to the user. This was not the case. He wanted to get as an incident to his sale of Sanatogen, a stable business and the good-will of the retailers that he might make more sales and thereby get a larger return. For that reason he devised a system of doing business, involving a standard price to the user which was in fact and in his opinion essential to his business prosperity. These conditions seem to establish a pecuniary interest on the part of the manufacturer of the patented Sanatogen the same in kind as, and perhaps greater than, that of Dick, in the conditions as to use adopted by him.

The men here who are so familiar with the history and development of the incandescent lamp in this country know that there are many reasons why the lighting industry would have been demoralized and the spread of the best and cheapest form of lighting ever known to man would have been checked, very likely to the point of real disaster, if it had been impossible to develop the business under the stable conditions of uniformity of price to consumers. You now have the agency system as to the legality of which there is no question. It is, however, troublesome and difficult so that in the case of many patented articles the manufacturer will not have the courage to work under that plan.

We are today almost in a condition of hysteria as to all matters affecting business. There is no doubt that there is a basis for the general feeling expressed so drastically in so many quarters, that there are evils in the business methods which have grown up during the past fifty years from which the consumer and the public have suffered. It is wise and proper to attempt to correct those evils but it is most unfortunate that in so doing attacks should be directed against practices like the current system of the re-sale control of patented articles, which are in themselves not at all unfair or unreasonable but which have been adopted for the single purpose of securing the sound industrial development of

enterprises and have had just that result, without oppression or injury to the public.

I have referred briefly to the history of the incandescent lamp business. No one can study the history of the development of the electric lighting and power industry generally, which is to so large an extent the same as the history of the incandescent lamp, without being impressed with the wonderful progress that has been made in it in the briefest possible period of time. It is only about thirty years since the incandescent lamp came into existence. In that short period of time the electric power and lighting industry, largely based upon that lamp and which might never have developed at all except for it, has advanced to its present volume and its present condition which is one almost of perfection. Every year there have been marvelous improvements and a far more perfect service, satisfying needs of the community many of which were not even foreshadowed a few years ago. Those who have been associated with this great work, and among the number is practically every one in this room, must have a feeling of keen satisfaction that they have had the privilege of taking part in its wonderful growth. The zeal, loyalty and energy of the men employed in it have been admirable beyond expression. To refer to one single instance, nothing could be more creditable than the spirit with which the lamp men here present and their associates faced the necessity of a change in the method of distributing lamps from that which prevailed for so many years to the one now in force; but everywhere there has been the same capacity, the same intelligence and the same loyalty.

Criticize us and our associates in the business as one will (and there is some basis for criticism because of our inability to learn at once how to deal adequately and properly with the most complex business situation that ever existed on the face of the earth), fifty or one hundred years from now when men look back to this day and generation, they will see much to commend, a great deal that is good in it. They will say: "While defects and evils existed, those defects and evils were those of a great era. They were exactly such as have appeared in every age of marked

progress such as have been incident to every real advance in the history of the world, whether in politics, in morals, in literature, in art or in industry." How great were the evils incident to religious movements that have done so much for the human race! The political and social reforms that led to our modern society and our modern civilization brought in their train evils that were heartrending. There were many sides to the glorious Renaissance of four hundred years ago that are painful to contemplate. But the good always endured and the evils which were such as necessarily come when men are excited by great ideas and aspirations were, to a large extent, temporary in character. In like manner, the evils of our time will disappear while the good will remain, unless in our impatience we destroy it in futile efforts to correct in a moment defects which only time can completely and safely remove, instead of attempting to eliminate what is wrong without undue sacrifice of the good that is so intimately interwoven with the evil.

Again, speaking from the standpoint of the philosopher or historian of fifty or one hundred years hence, he will surely say that the latter part of the nineteenth century is for all time entitled to the admiration of the world for the wonderful things it did by way of industrial development, and for the skill, intelligence, resourceful energy, imaginative power and resolution of purpose upon which that development was based. More than that, he will say there never was a time when men devoted themselves with more sincerity to the duties of their time and work; there never was a period when they struggled harder for accomplishment, with more self-sacrifice and effort against difficulties which must have seemed insuperable; there never was a time when men were more influenced by the pride of achievement and the joy of the work as distinguished from mere personal gain; and there never was a time when there were developed greater administrative capacity, greater executive ability and greater power to reason from the known to the unknown, from the seen to the unseen; and, more than all, he will surely say there never was a time when there was greater loyalty to sound ideals, not

merely on the part of those who were the leaders with all their defects, but among the rank and file of the army of men who participated in the great movement. The loyalty of every man in this room and his associates throughout the country to the enterprises in which they work and the organizations for which they work, and to the ideas that are behind those enterprises and organizations is most admirable and striking. Nothing could have been accomplished without it. It is appreciated now by those who know the facts and it will be the admiration of future generations.

Dr. Charles P. Steinmetz discussed Mr. Fish's address as follows: Mr. Chairman, I don't think I need to express my admiration of Mr. Fish's address. You all realize it very much better than I can express it.

To come to the subject matter, the question of re-sale, when you think of it, after all, the fixing of a re-sale price is the elimination of competition between the jobbers and between the retailers, and the opposition against it in the public opinion is the same opposition against eliminating competition which you meet all over the country, and which is the foundation of the opposition against the corporation. In the public mind competition is still the foundation and the driving force of our industrial progress. Our great national economists, who fill the chairs of our universities, are still preaching and believing that competition has made and is driving forward our industrial progress. They have not realized yet that competition is dead as an industrial and economic force.

Competition died on the day on which the advance of engineering had increased the means of production of a commodity beyond the maximum amount which could be consumed under the existing social conditions. On that day competition ceased to be a progressive driving force and became a destructive force. The idea of competition as a benevolent force in the industrial progress was based upon the theory that by competition between the producers prices would be lowered down to near the cost of production,

stopping just as much above the cost of production as is necessary to give a fair profit. But the fallacy involved in this reasoning is the neglect of the economic law that it is financially more economical to operate a factory or an industry at a loss than it is to have it stand idle; because to have an industry, a factory, stand idle involves the continuous expense in fixed charges. The result is that unlimited competition, with the ability of producing beyond the demand, forces the prices down not to the value giving a fair profit above the cost of production, but the dropping of price stops only there where it would begin to get cheaper to stop production, that is, where the loss in production exceeds the loss of having the industry stand idle. The limitation of price forced by competition, therefore, is below the cost of production, and as the result the level reached by free competition is an unstable condition, a condition of production at a loss, which can exist and continue for a limited time only, but finally ends in receivership, and the destruction of the industry.

Many of our political economists, our university professors, have not yet worked up to this economic law; and many of the men who are engaged in industrial work, do not yet realize it either, but still prate about competition as a benevolent force without realizing that it has become a destructive force. The natural result of this industrial law was that competition could not continue, but that intelligent people in charge of industries, had to stop free competition and get together before the level of destruction was reached. This led to co-operation as the force which is taking the place of competition. But at the same time the theoretical men, well meaning theoretical economists or statesmen do not realize this economic law, do not understand it, but they only see competition vanishing before co-operation or consolidation, and still dreaming of competition as the beneficent force which it was in the early days of industrial development, they endeavor to restore competition. Therefore, you see, all the attempts to resurrect to life a dead issue by legal enactments, by trying to break up the corporations, forbidding the control of the re-sale price, is contrary to the economic law underlying

present industrial production, and is therefore hopeless, and is a failure. You may destroy the industries, but you can not restore competition. It is dead. Co-operation must take its place.

This, many of our leaders of thought in the theoretical field, in our universities, in our political offices, have not realized, neither do the mass of the people realize it yet, and consequently they mistake the effect for the cause. They imagine industrial consolidation is killing competition, and try to stop consolidation to break up the corporation, while in reality the death of competition as a beneficent industrial force is the cause of consolidation which has led to the corporation as the only economical means of industrial production.

Therefore, it is up to you, up to all of us, to go out and explain, to educate the people, to make them understand that with our industrial conditions, with our enormously increased means of production, competition can not exist any more without self-destruction, and co-operation must take its place. And with the arrival of co-operation in industry, with the consolidation into giant corporations, must also arrive some supervision, some control by the political organism, as Mr. Insull, Mr. Vanderlip and other speakers have pointed out, by commission or whatever form it may economically take, but even this may be only an incident, only temporary until the forces have adjusted themselves. But the effect of all of this is that co-operation today is the driving force of our industry, and competition, which started our industrial progress, is dead, just as dead as the feudalism of the middle ages is dead.

On Friday afternoon Chairman McCall read a letter from Mr. S. Decker, of the Public Service Commission, Second District, State of New York, and opened the meeting by calling upon Mr. J. Robert Crouse.

THE SOCIETY FOR ELECTRICAL DEVELOPMENT

By J. Robert Crouse

PERHAPS it may be well to state, by way of introduction, that Mr. Doherty only a moment ago, in the adjoining room, requested me to appear in the program, and I shall try, like Senator Howland, to respond like a good soldier. Fortunately I have in written form my thoughts and beliefs in this matter, which, with your indulgence, I shall take the liberty of reading.

There are always some underlying, basic principles governing all change and progress—whether in the field of research, engineering, manufacturing or merchandising. These principles are of the same essential quality as the axioms in mathematics or refined statements of particular relations, such as $C=E/R$ in our electrical business. Such principles do not depend for their truth or power upon minority or majority assent, and when once fairly stated, are assured of final acceptance since essential progress must be made in harmony with them.

Progress in our electrical business during thirty years (notwithstanding that less than thirty per cent of the population is electrically served) has been one of the wonders of the world; its contribution to the comfort, happiness and efficiency of our modern life is so great that we wonder how a preceding generation did without it. We may justly feel proud of such a magnificent business which in every department of its development is so worthy of our best thought and effort.

The efforts of those engaged in the fields of research, engineering and manufacturing, have shown the most marked results, since, while enjoying the stimulus of the friendly rivalry of other men and organizations, they have been free from the sort of competition which makes the accomplishment of useful results expensive and difficult. It is a matter of common observation that rapid

J. Robert Crouse

progress has been made in discovery to practical manufacture, and improved products tending to better conditions of generation, construction and distribution systems.

However, in the field of selling and distribution we are challenged by the cold fact that no essential progress—meaning by this a decreasing ratio of sales expense to sales—has been generally accomplished. Not only this, but there is a prevailing opinion among the manufacturers, jobbers, dealers and contractors that the ratio of sales expense to sales tends to increase. The annual reports of some of the largest electrical manufacturers make specific mention to this tendency as a fact in their operation. Among central stations this is doubtless less true, since by common consent they are properly monopolistic for the best results and competitive only with other methods of furnishing service for light, heat, power and other useful purposes.

Our electrical business, technical in its very nature, has doubtless for that reason placed less emphasis in the past on aggressive selling and distributing effort—witness the fact that the first commercial papers in the National Electric Light Association appeared only so recently as 1905, and national advertising by individual companies began about 1907-1908.

It is estimated that the gross sales, ratio of sales expense and sales expense for 1912, in the electrical business, were approximately as indicated in the following table.

BRANCH OF BUSINESS	GROSS SALES, 1912	Per Cent Ratio Sales Exp. to Sales	SALES EXPENSE 1912
Central Stations	$400,000,000	5%	$20,000,000
Mfrs. and Jobbers	300,000,000	15%	45,000,000
Dealers and Contractors	100,000,000	15%	15,000,000
Total	$800,000,000		$80,000,000

This $80,000,000 of sales effort (which is equal to one-fifth of the gross sales of all the Central Stations) is incurred by approximately 5,000 Central Stations, 500 manufacturers, 200 jobbers,

5,000 dealers and contractors—a total of 10,700 organizations. It is of special importance to note that $60,000,000 of this $80,000,000 sales effort is incurred by the manufacturers, jobbers, dealers and contractors who operate under the complete competitive conditions, at a sales expense ratio of at least fifteen per cent —and tending to increase.

While this table and the above comments are broad generalizations, the reader is asked to check the principle and its application, in his own particular case.

These facts in themselves are a challenge to commercial men which can not be avoided. They justify the most careful search for causes and investigation of plans for improvement.

Whatever minor causes may be contributors to this failure in more efficient merchandising, the major one, which experience and the facts disclose, in competition among these thousands of companies, resulting in expensive duplication of all kinds of sales efforts and failure to co-operate in a definite organized plant in those kinds of endeavor which supplement legitimate competition.

This competition is to a very great extent to secure the business held by others or of natural growth—which we may characterize as the existing market. A very large part of the selling effort is exerted on this existing market and dissipated in commercial friction and lost motion, with resulting decrease in its creative effect.

The fact is frequently overlooked that the current-consuming devices for light, heat, power and other useful purposes, are the only aspects of our business in which the public are or can be intimately interested, while they constitute but a small part of the resulting business from the boilers to the devices the public uses. We are therefore all, without conscious organization, joint sellers of the final service.

The age of business (in which someone has said we live to do business, instead of doing business to live, in the base sense) is in the order of social development the successor to the period when war—the extreme of competition—was the principal occupation. Business has inherited from this prototype many habits of enmity,

antagonism and waste, which only the persistent cultivation of good fellowship, harmony and economy will gradually supplant. The most successful organizations which I have observed have given the greatest attention to the cultivation of harmony among their men, and the spirit of progressive, constructive effort. This same result must measurably follow similar conscious effort by an entire industry—especially one whose existence in its present form depends on the public's good will and appreciation.

The Society for Electrical Development proposes a broad, common organization of our entire industry: central stations, manufacturers, jobbers, dealers and contractors (controlled by a balanced representation from each, but not by any one alone), through which a part of this $80,000,000 of unorganized and competitive sales effort can be more effectively exerted through organized and co-operative effort in promoting and popularizing electrical service. These plans to teach the public to "Do it electrically"—many more than can at once be undertaken—have been worked out and endorsed as entirely practical by many prominent men in our business.

The Society proposes at the start that a minimum of $200,000, or but one-fourth of one per cent of this $80,000,000 of competitive sales expense, be co-operatively expended. The basis of subscription is, for manufacturers and central stations, one-fifteenth of one per cent of gross sales, and one-twentieth of one per cent for jobbers, dealers and contractors, amounting, for illustration, in the case of the former, to $66.67 per $100,000 or $666.67 per $1,000,000 of gross business, and in the latter to $50 per $100,000 or $500 per $1,000,000 of gross business,—the subscription being on an annual basis. This means in the case of a company having a fifteen per cent sales expense account, but one-three-hundredth of their sales appropriations. There are few organizations which can not locate competitive expenses of doubtful value equal to the Society's subscription. While individual subscriptions are comparatively small and in no sense burdensome, yet general co-operation in the movement will make a fund of $500,-

000 per annum available for progressive and aggressive market cultivation along these new lines.

This Society creates the organization and the fund through which some of our dollars can co-operate with the good will of us all in broad effective activity for the expansion of the market, while we continue with the most of our dollars to compete for our fair share.

This plan means real progress in the direction of more efficient distribution of electrical service through joint cultivation of our common market—the great preoccupied, incredulous, money-spending public—a result which our present systems neither accomplish nor promise ever to achieve on the old lines.

The plan presents a new kind of consolidation for sales efficiency through a better balance of competitive and co-operative effort to which the popular thought will not now nor in the future take exception.

The plan means that electrical men—identified with this most wonderful of all business—will demonstrate for themselves and by example for others—the true principles which underlie progress in more efficient sales distribution, through the creative cultivation of the market. The plan lends dignity to the art of selling—synonymous in the best sense with service—and marks a further point in the age now happily passing, when the selling spirit was symbolized in the economist's expression *Caveat Emptor*—"Let the buyer beware."

Now, I have had a good deal to say and have written extensively along these lines during the past few years, as I presume most of you know. Possibly I have, in consequence, laid myself open to the classification of a conversational co-operator. It is my earnest desire, however, to have my faith checked by my works, which, at this particular time, I submit, in the form of a personal subscription of ten thousand dollars, toward the minimum fund of two hundred thousand dollars now in process of being secured,

J. M. WAKEMAN

PLANS OF THE SOCIETY FOR ELECTRICAL DEVELOPMENT

By J. M. Wakeman

MR. CHAIRMAN AND GENTLEMEN, I have not come prepared to make any address, because I have only been told within the last ten minutes that I was expected to do so, and I want to confine myself chiefly to outlining the plans which The Society for Electrical Development contemplate carrying out in their work. There has been quite a good deal of feeling that possibly our intentions were good, but there is just a doubt as to whether our plans are practical. I would like to say that our committees are all made up of practical men. Our Advertising Committee, for instance, is made up of men who conduct the advertising campaigns for the largest companies in the electrical industry and for every committee which we put to work we use the material provided by the members of this society, and that includes the large manufacturers and the large central stations, jobbers and contractors; so that we have the best material of the electrical industry to call upon for our committees, and they are all practical.

The Society for Electrical Development is the outgrowth of the new spirit which has rewritten that old adage frequently referred to this morning. It reads today, " Co-operation is the life of trade," and The Society for Electrical Development proposes to prove that. The successful man of the future is going to be the one who can co-operate with the largest number of his fellow men, not only including those in the business with him, but including the great general public to whom he sells. That is true whether it be the electrical or any other business.

The membership of the Society, as I think you all know, embraces all the various interests in the electrical industries, and in order to be able to do something from which every man in the industry will derive a proportionate benefit, one of our plans is a great national educational advertising campaign. That campaign will be carried on in the popular magazines, such as the *Ladies' Home Journal*, the *Woman's Home Companion*, *Good Housekeeping*, and papers of that description, in which we will carry our advertising, all of it along educational lines, none of it grinding any one man's or any one corporation's axe. It will be devoted to no one particular interest, but will educate the public to "do it electrically." We will also provide articles especially written by men whose names carry weight with the publishers of the popular magazines. Those articles will be some of them educational, and some of them in the shape of stories which will interest the people along the line of teaching the advantages, the economy, the cleanliness, and the safety of electricity in the home. We will also supply a series of articles to the technical press—I mean the papers devoted, for instance, to milling, textile-manufacturing, paper-manufacturing, etc. The articles prepared for the textile papers will be written by men who are known in the textile field, engineers who have made a special study of equipping with electric machinery woolen mills, cotton mills and other manufactories. Some of the articles will appear in the papers devoted, for instance, to the paper industry, and the engineers best known for their work in equipping paper mills will be called upon for such articles, for which the society for electrical development will pay, and provide the newspapers and magazines with them, insuring their being published by having them written by men whose names carry weight.

The Publicity Department is a little aside from the Advertising Department, and is intended to put into the daily newspapers the correct news in regard to electrical devices and electrical apparatus and their use, and also in regard to electrical corporations. Public utility corporations have been the target of a good deal of abuse. Some of it has possibly been deserved; a

whole lot of it has been in the shape of distorted statements. One of the duties of The Society for Electrical Development will be to investigate and put into the daily papers in the localities where it is necessary, correct statements in regard to public utility corporations which are being persecuted and misunderstood. We have always rendered service of that character. There was a corporation, a lighting company which called upon us for assistance, and while we were not as yet able to go to work actively, we loaned them one of our men, and he had n't been there but three weeks before an article appeared in the local paper which was friendly and complimentary to the local lighting company. The manager said it was the first time in seven years that any paper had said a kind word for them; and there has n't been a fortnight since that there has n't been at least one or two friendly articles in the newspapers of that town.

Another method of teaching the people to do it electrically is through the medium of the moving picture. You saw the other evening here a series of educational films. I don't know that the subjects of those films were new to you, but they at least interested all of you. Those of you who know just how a moth lays its eggs, how it is hatched, and its development around the cycle until it becomes a moth again were nevertheless interested in watching that on the screen. We can't undertake to put into the moving picture theaters films which will describe the construction of electrical apparatus, but we can put in pictures which will show the result of using it. And we have had one or two scenarios written, full of human interest, with no suggestion of advertising in them, and yet carrying, all the way through, the advantage of the use of the electrical apparatus in the home, the shop, the facotry and on the farm. And whatever the scenario is written about, the moving picture catches the people in a receptive mood and puts the subject before them in an interesting and attractive manner, so that the point is absorbed unconsciously by the audience. We started to find the cost of that, and we found that the moving picture people wanted $500 dollars to $2000 dollars to make a film of 1000 feet. They would make it and rent it out

for twenty-five dollars a day. I have negotiated with them and got them down to five dollars a day, so that any central station through out the country can afford to hire a moving picture film of that kind for a few days each year at least and have it shown in the local theater.

Another method we have in mind is a demonstration car, to be equipped with electrical apparatus and sent around the country, preceded by competent press agent work and accompanied by expert demonstrators. The local company will supply the " juice," local interest will be aroused, and the local newspapers will advertise it; householders will be interested in household devices, and small motors will be displayed therein, and there will be large electrical signs on the outside of the car, which, we calculate, will arouse the enthusiasm of people in the smaller towns who have n't the opportunity of seeing large electrical display shops. That is of course to reach the somewhat smaller communities.

The contractor is a man who is interested in this movement, to such an extent that of the membership in the society today the second largest class is the contractor—first the central station men, then the contractors, next the manufacturers, and the jobbers. The contractor wants to know where he comes in on these plans, and they are not all of them able yet to see that the development of the latent market will bring business to them naturally, as it will to every one else in the industry. But we have a branch of our work which does appeal particularly to the contractor, and that is that where we find friction between the central stations and the local jobbers, dealers and contractors. In such places the electrical industry is not being developed to the best purpose because there is friction. Part of the work of this society will be, on call from members, to visit such towns and cities and take up with the local interests the questions which are causing that friction, and as far as possible eliminate them and bring the interests together so that they will work in harmony.

Another part of our work will be the conducting of new business-getting campaigns for central stations who have not the machinery for doing that, who would like to do it if they knew how and had

the men. We will be in a position to supply them with the information as to how to go about it, and we hope also to be able to supply them with the men to conduct it.

Naturally we will be expected to prepare advertising copy for the use of our members who are not themselves big enough to have an advertising department of their own. Also we will maintain a bureau of statistics, which will be valuable for any member who wishes to secure information in regard to his own or some other part of the industry.

Those are only a few of the various plans. I am trying to make you see that they are plain, practical, every-day plans; but they can't be carried out without funds. We are asking only one-fifteenth of one per cent of gross sales from central stations and manufacturers, and one-twentieth of one per cent from jobbers and contractors. It is sixty-six cents on the thousand dollars to the central station and manufacturer, and fifty cents on the thousand to the jobber and contractor. It is so small that it is not a serious matter to any company in the industry, even in the case of the company that subscribes a large sum—they must be doing considerable business to make it a large sum, so that it will be comparatively small for them.

You heard Mr. Fish say this morning that the latter part of the nineteenth century would go down in history because of the achievements of the men in the industrial and financial world. You listened to that magnificent eulogy, which was well deserved, and I was impressed with the idea, while he was talking, that if the electrical industry can really grasp this modern spirit of co-operation and get together so that all the interests are working harmoniously and their effort is united instead of being entirely competitive, we can "put it all over" the last part of the nineteenth century.

ORGANIZATION OF THE SOCIETY FOR ELECTRICAL DEVELOPMENT

By W. E. Robertson

MR. CHAIRMAN AND GENTLEMEN, I am not going to say very much on this subject because I don't want to steal any more of Mr. Doherty's thunder; but I am going to present this subject to you from possibly one or two new angles.

To achieve success in any business undertaking, you must have certain essential elements present. One is opportunity, but opportunity alone does not mean success. Another thing you must have is ability and integrity, but ability and integrity, with opportunity, mean nothing unless you also have financial power. And when you have opportunity, and ability and integrity, and character, and money, why, then your problem is a simple one and success is assured.

Now, we have in this Society, represented in its officers, men of the highest ability in the electrical industry. When we mention Mr. Burchard, of the General Electric Company, Mr. Layman, of the Wagner Electric Company, Mr. Osborne, of the Westinghouse Company, Mr. Doherty, Mr. McCall, represented by Mr. Johnson, the treasurer, Mr. Insull represented by his right bower, Mr. Gilchrist; when we take Gerard Swope, representing the great Western Electric Company in its sales efforts, and the lesser men, all successful, hardheaded men who have risen to the top in the industry, we have in our organization ability and character.

We talk about opportunity for service, and every speaker here has mentioned the great possibilities of our own industry—five million horse power already connected and ten million more to be had if we reach out for it. Mr. Vanderlip has spoken of the

W. E. Robertson

need of money to finance our enterprises, and we have also had presented to us at this meeting the fact that density of population gives greater earning power to the central station property than a sparsely populated district. Now, we can increase the density and variety of use of the existing plants in the country, thereby tremendously increasing their earning power, making electrical investments very attractive to the public, and thus help to solve the great problem of additional capitalization.

We have opportunity, then, because our industry is still young. We have men of ability and character who have worked out plans that have been approved by the executive and public policy committees of the National Electric Light Association, by the executive committees and managers of great manufacturing industries, by the contractors and the jobbers. Why, there must be merit in the proposition. Now, we say we won't start until we have the essentials for success, until we have got a fair chance to win out. We are not going to start until we get two hundred thousand dollars. If that is right, and we have opportunity and ability and character and money, how can this thing fail?

But we go one step further; you are only committed for one year. If we can't prove the dollars and cents value of the Society in co-operative work, then it will necessarily fail, and we men who are standing before you as sponsors for it will appear to you as dreamers rather than men of imagination coupled with sound horse sense.

Now, as to the amount of the subscription, I am going to use the illustration of a poker game. Whenever you buy a stack of chips, the white chips are the smallest denomination, and you then get your red and blue. Now, we as jobbers have a stack of four hundred chips, all white chips. Three hundred of these chips we use in our business, competitively. One hundred of these chips represents our profit, provided we are eminently successful and can make five per cent on our turnover. Now, the Society asks you to give it one white chip. They ask the manufacturer, or the little contractor, or the big contractor, for one white chip. It does n't make any difference what your game is, whether it is a five

hundred dollar limit, or one hundred dollars, or table stakes, the white chip is always the smallest denomination; and The Society for Electrical Development asks the electrical industry as a whole to chip in a white chip. And if we can't make you see that you are going to get ten or twenty white chips back from it, then our scheme is a failure. We have come to the time when we want subscriptions. We have talked this thing over; we have sent out in the last seven weeks seventy thousand pieces of literature, to every contractor, central station, manufacturer, dealer and jobber in the United States of whom we have any knowledge or record. The Jovian Order is actively at work advertising in that manner.

Now, if we are satisfied that the scheme is sound, why not get the individual subscriptions of the corporation you represent here, and in addition help us to get one or two more? Let each man do his share, and there is n't any doubt but that on the first of November or before, we will have the two hundred thousand dollars which is essential to the trying out of this scheme.

HENRY L. DOHERTY

CO-OPERATIVE ASPECT OF THE SOCIETY FOR ELECTRICAL DEVELOPMENT

By Henry L. Doherty

MR. CHAIRMAN AND GENTLEMEN, I don't want by any chance to have The Society for Electrical Development appear in any other light than what it is, and that is the light of friendly co-operation between the various interests that make up the whole electrical fraternity. But I do want to draw a certain comparison to make plain a point that has been in the minds of many of us. The electrical business today is in the hands of thousands of differently owned organizations—partnerships, corporations, individuals and what not. These people are again divided more or less, because some supply central station service, some supply machinery for central stations, some equip-, ment for consumers, some do the wiring work, and we have an enormous number of people interested in the electrical business. We have today no plan by which these people can co-operate, nor did any society exist previous to the formation of The Society for Electrical Development, where all these people could contribute. There is no one society where they are eligible for membership. This is such a society. Somebody referred this morning to the influence of the mail order houses. To the extent that they handle electrical apparatus and supplies, they are eligible for membership, and I have no doubt we will get many subscriptions of that sort.

What I started out to do is to contrast the way the business is now conducted, in the hands of these many thousands of people, as against the way it would be conducted if it were all owned by one enterprise. Today we find methods of intensive cultivation used in this city and that city, while perhaps one hundred, or fifty

or five miles away nothing at all is being done. If we could bring about the intensive cultivation of the electrical interests in the different cities, we would accomplish a great deal for the development and application of electricity. It is a work that none of us need feel ashamed of, and a work which we can all feel proud of, because roughly you can measure the advance of civilization by the extent to which you eliminate human labor and substitute mechanical labor for it. There is practically nothing that is done now that is laborious to the human workman that could not partially or entirely be done by mechanical energy transmitted by means of electricity. Doctor Steinmetz gave an example that has sometimes bothered me to express, and that is, we seldom use electrical energy as such, but first transform it into some other form of energy. But electricity has given us the means of transmitting power divisible into small units, without any objectionable by-products, and as I walk along the streets every day, I see work that is laborious, and is done by human effort, which might be done by mechanical energy, which could easily be supplied by electrical energy.

Now, it is not possible or desirable, even if the laws of our country permitted it, for the entire electrical business of the country to be in the hands of one concern. But we can form some broad, comprehensive plan, whereby we can all co-operate to bring about the greatest possible development, and that is what we are trying to do in the present organization. We now have subscriptions amounting to over $135,000, and we know that many other subscriptions are in the hands of the Jovian Order that we have not yet heard from. Our membership already exceeds four hundred, we have no doubt of reaching the minimum number of four thousand, and we expect to greatly exceed it, and we expect to get a large number of these people who have never done anything to come in and help with this movement. I have no doubt there are many people who have heretofore done nothing, and have no means of doing anything and this organization has enabled us to get them in.

As you probably know, the Jovian Order is now an organization

13,000 strong, and amongst others it includes practically every able electrical salesman in the country. We have the hearty support of that organization, and they are out now and have been for three weeks, in the effort to bring in subscriptions above the two hundred thousand dollar mark. We expect to work in harmony with that organization and expect them to be a great factor in this work.

We are also working in closest harmony with the Commercial Section of the National Electric Light Association, which, as you know, embraces almost every clever and able new business man connected with all the central stations in the United States, together with the new business men and advertising men of the various manufacturers.

We believe that, intelligently expended, one dollar will bring returns to the industry as a whole of at least ten dollars. We have already gotten over the troublesome point of how to adjust the assessment against the various interests. That seemed to be one of the difficult points, but we have all agreed upon it; and even if the assessment is not strictly equitable, we feel certain that everybody will get returns much greater than the amount they pay in towards the work of the society.

We believe that an enormous amount of work can be done without any expense whatever, or merely nominal expense, and yet it will bring large returns. We believe that heretofore there has been no society which could properly co-operate with other organizations, such as the architects and the various other trade organizations along that line, all of which have conventions that meet once a year and have active committees working throughout the year. We believe we will, by working with those organizations, be able to do a great deal towards bringing about the broader application of electricity, without any expense to our society, or at least with only nominal expense, and I think you will all agree that that is a reasonable expectation. We think that heretofore there has been no organization which has been completely effective in working together with the national advertisers. We expect to be able to work with the national advertisers to bring about a greater

use of electric sign advertising, and things of that kind, and stimulate the business, and stimulate it enormously.

I can't talk with the same aggressiveness on this particular subject as I could on some other subject, because it seems to me that the problems of getting together, co-operating to try to harmonize and bring about active development and work of this sort, should be so apparent and so unquestionably beneficial to the entire industry that I almost feel it is not worth while to debate it—I can't get the aggressiveness in debating a subject that it seems to me is unanswerable.

I was greatly interested this morning in the address of Mr. Fish and the address of Mr. Vanderlip, and there were some things which came up in connection with both that have a bearing on our work. There was one thing that appealed to me particularly in Mr. Vanderlip's address. Mr. Vanderlip spoke about the enormous amount of money this industry would demand for the next four or five years. His figures and mine don't differ materially. I have made the statement that even in the poorest year it is necessary for the public utilities of America to raise at least three hundred million dollars, or a million dollars a day for every working day in the year. Now, I can see, on reading these figures to some of the members in the room, they would have made them wonder where in the world the money was coming from to provide the money needed for this business and this business alone. I have had some experience with many of the men in this room, in a financial way, and it has been instructive to me to see how some of them look at it. The money wealth of this country is, roughly—and I don't attach any accuracy to these figures, because my business is primarily that of an engineer—the money wealth of this country is approximately $3,700,000,000. Of that money wealth about $350,000,000 is tied up absolutely in government money that is not on deposit in the national banks, reducing our national wealth to $3,350,000,000 of which it requires about a billion dollars to maintain our national bank reserves, leaving $2,350,000,000 to transact the business of this country. If you will look at the bank reports it will appear that our legal reserves are about

$1,400,000,000, but the other $400,000,000 is devoted to cross-deposits.

Now, I want to remind you that every year we not only carry on the enormous business of this country, the railroad investments and everything of that sort, but in addition to that we move $10,000,000,000 worth of farm products, with $2,350,000,000 of money, and various students of political economy will tell you that the farm products move through three hands, and from that up to ten hands. I don't want anybody to get the notion that merely because we need $400,000,000 a year to finance the public utilities, that that means any great drain on our money resources.

There was another point in Mr. Vanderlip's address that would have considerable bearing on this work, and we all know that we have been passing through an evolution in matters of investment that amounts to little less than a revolution. We have seen in fifteen years New York City bonds sell on a 2.65 per cent earning basis, as against selling now on practically a 4.5 per cent earning basis. We have seen the rate of returns advance 70 per cent. And taking British consols as an example, we have seen the market value of certain gilt-edged securities shrink 40 per cent. In other words, the rental value of capital has gone up enormously in the past few years. That has had a bearing on the electrical business the same as on every other business, and it is going to be a great problem how some lines of business can meet this enormous increase in the rental value of capital, and while those in the public utilities may look on it with some apprehension, surely they have less reason than those in almost any other line of business. We are in a line of business where we have got still an enormous margin between our selling price and our manufacturing price, and I, for one, don't know how some lines of business are going to meet this problem of the increased rental value of capital, but to me it is not difficult to see how the electrical business can do it, because it has opportunities which other businesses do not hold. There has never been a time when work of this sort could be more effectively done than at this time. We have laid the foundation, we have developed many devices and have recently brought about many

improvements that simply mean doing in other places what has already been successfully done somewhere else. In other words a great deal is available to us to accomplish here, there and everywhere, which is beyond the experimental stage and is in a thoroughly demonstrative state. It is a simple matter, with the capital, with the proper salesmen, with the proper men to install it, to convince the investor that an enormously greater revenue is awaiting him. We do know, that in the central station business, in fact in every branch of the electrical business, that as we increase our volume of business we increase our profits more than proportionately. And there is every reason why, in the face of these various things, this movement should be undertaken, and at this time. There is a great deal more that I might say as argument why this work should be undertaken and why it should receive the cordial support of the entire electrical industry, but, as I said before, it seems to me unanswerable that it should be done, and instead of taking all the time that has been allotted to us—and I think the chairman said that if necessary he would give us an hour and a half—instead of trying to take all your time, I would like to see the remaining time left for discussion by those who are interested in the subject.

I would like to close with one point that I did n't cover. I don't want Mr. Vanderlip to think that I am quarrelling with his paper, because I am not, and I am one of the men that feel like taking off my hat to him for that paper. But I am merely supplementing some of the things he said in that paper, and I thank Mr. Vanderlip for being able to quote figures in that paper that I did n't know myself. But here is something that may interest everybody in this room. In the first place, I celebrated my thirtieth year in the public utility business last October, and during that time I have learned a good many things, like the burnt child learns not to put his finger back in the fire. I am in the class in this business with a great many men, and I refer to the remark made by Mr. Vanderlip about the dreams of the promoter and the dreams of the man who is founding an enterprise. I know of no other line of work where the representations of the promoter have n't been enormously discounted. I can bear out from my own personal experience that

the predictions made by men in this business have never been as great as the results, and I want to point to one thing as an example, and that is to the various bond issues that have been made on these various properties. Trace the history of the bond issues that have been authorized on gas and electricity, and especially electricity, and you will find that no man ever put together one of these corporations, until in recent years, and as yet we have n't the proof of that, ever provided a proper amount in authorized bonds, nor do I know of a single case of a company that has been aggressively and well-managed, where the earnings have n't exceeded the predictions over a long term of years. For a great many years I was connected with Emerson McMillin and Company, when they were the most active house in this work. We never made a bond issue that was big enough, and there never was a case where earnings did n't exceed our figures over a long period of years. About five or six years ago, or perhaps longer, to be exact it was in 1907, associated with other people we wanted to issue bonds on a certain city, and we wanted at that time to sell a million and a half of bonds. One of my associates negotiated the sale of these bonds with a certain bond house, leaving the one item that I considered of greatest importance, to be determined later by mutual agreement. These mutual agreements are all right when you are trying to hold the other fellow down, but all wrong when you are trying to boost the other fellow up. When I found out that the agreement had been closed in that way, I went over to the bond house and said, "One important matter has not been attended to, and that is the proper authorized issue of bonds for this property." I said, "We want an authorized issue of $18,000,000." But they said, "That is absurd." I said, "What do you think it ought to be?" "We would say about $3,000,000." I said, "How do you figure it?" Well, it turned out that they had n't figured it at all, and I doubt if any one up to that time had ever attempted to figure what the authorized issue of bonds should be to carry the company through the life of the mortgage. I said, "Perhaps you would be interested in my figures," and I showed them that that property would need during the life of that mort-

gage $18,000,000 and I had based my figures on the average growth of American cities of that size for the past thirty years, assuming that that growth would be maintained. I assumed that we would have a business only equal, on a per capita basis, to what was already being done, and that our investment would be four dollars for every dollar of increased annual business, which figured out that we would require an $18,000,000 bond issue. So, after a great deal of talk back and forth, they finally agreed to let us have an authorized bond issue of $10,000,000. I mention that simply as an example, for you people realize what it means in a city growing at the rate of three and one-half per cent a year, which means that our American cities double every twenty years. Our consumption of electricity increases on a per capita basis rapidly as the city grows; that is while a small city will only use one dollar's worth of current per capita, a big city will use ten dollars' worth. Then comes in this factor of stimulation, which has been going on for the past few years, added to these other factors, and I think once we have gotten down to normal or whatever our industrial condition will be after this crisis is over, we will find that all our electrical properties are intrinsically sound and they will make even more money than we have predicted. And I think that the truth of this will have a great effect in getting your four out of five investors that Mr. Vanderlip has spoken of. I think they will find that the electrical business will have the ability to meet the situation which many other industries have not, and if they have money to invest, they will find the ideal investment is the electrical investment.

Mr. J. C. Bartlett discussed Mr. Doherty's address as follows; Mr. Chairman and Gentlemen, my head is still swimming from these millions and billions of dollars. They are beyond my comprehension and grasp. But this is a work of practical commercial co-operation, and without wishing to steal Mr. Williams' or Mr. Smith's thunder, which will roll later on, I just wish to add a word, not of criticism, but of encouragement. And I am doubly proud of Philadelphia, in having our chairman from there; and

where I believe the first practical co-operation in advertising originated, with what I conceive to be the essential feature of it, and that is the absolute sinking of the individual in the general whole. Now, Cleveland preceded Philadelphia, as you will see by that electrical page on the wall, but in that electrical page each manufacturer, each subscriber, maintains his individuality. In the co-operative advertising of electrical vehicles in Philadelphia, the cause of that was that the electric vehicle dealers were spending twenty-four per cent of their gross sales in one year in advertising electric vehicles, and it does n't take Mr. Vanderlip many minutes to figure out what our profits were, when we receive a commission of twenty per cent on the gross sales of those vehicles. Speaking personally, the following year, after we had contributed $2,000 to our campaign, we sold $80,000 worth of electric vehicles, which made an appreciable difference in our advertising proportion. That is all, gentlemen.

FAVORABLE CONDITIONS FOR LABOR

By Dr. Thomas Darlington

MR. CHAIRMAN AND GENTLEMEN, first I would like to thank those that are responsible for my invitation to come here, as I have enjoyed the sessions very much indeed. They have been very instructive and helpful to me.

There has been a great deal said today in the various addresses of the wonderful progress that has been made in the century. Wonderful has been that progress, most of it so recent that many of us have seen much of it. Coincident with this wonderful progress in the last thirty-five years, there has been wonderful progress, the same sort of progress, in the practice of medicine. True, something had been done before that time. If we were to look back to the time when the Irish emigrant came to this country, nearly every ship-load that came in brought typhus fever. You never hear of it today. Go back a little more than a century, and the third of an empire was swept away in a single year by small-pox, practically unknown today even in our great cities. The typhoid fever death rate has been cut in two. Even since I began practicing medicine the death rate has fallen more than one-half in New York City. When I commenced the practice of medicine the death rate in New York City was nearly twenty-nine per thousand. The last year I was in the health department, there were 74,000 deaths, only a little over fourteen per thousand. Had the same death rate continued as when I commenced the practice of medicine, there would have been, instead of 74,000 deaths, 148,000 deaths, and eight times as much sickness.

In later years progress has been very rapid. The fall in the death rate of diphtheria in fifteen years has been 74 per cent. The

DR. THOMAS DARLINGTON

success of the Japanese over the Russian army was very largely due to sanitary science. The making of the Panama Canal has been dependent upon it. You could not have had the Panama Canal except for the advance of hygiene. It would have been a failure except for sanitary science. And so I might go on citing illustrations of the progress that has been made.

It is beginning to be understood, and soon will be generally realized, that much effort has been wasted and much efficiency has been lost, by lack of attention to industrial hygiene. Matters of this kind have been considered as philanthropic, and therefore not to be considered in connection with business enterprises. As the business transactions of the world naturally have for their prime object financial profit, most proposals must be measured by money. But while the inspiration for bettering working conditions has arisen from philanthropists, true economy has played a large part in the ultimate progress of sanitary reform, and will continue to do so. That it pays to safeguard the lives and limbs of the workmen by guard-rails about pulleys and belts, is a conclusion that is obvious. Not as obvious, but just as far-reaching in its results, is the safeguarding of employees against disease. It is axiomatic that efficiency depends on health. It is therefore of great commercial importance that workmen not only be surrounded with proper safeguards for the prevention of accident, but also for the prevention of sickness, and that everything practicable be done not only to prevent disease but also to raise the standard of health to the highest point. Now, responsibility for the health of the community may be divided under three heads: 1. Personal hygiene, or care of employees by themselves. 2. Care by a company within its enclosure, its buildings, wherever it owns property. 3. Care by authorities (town, city, state and national) in making and enforcing laws.

While public hygiene can be enforced, personal hygiene is largely a matter of education.

Now, first in regard to personal hygiene, what employees can do for themselves; this comprises the regulation of meals—the amount, character and mastication of them; the amount and character of drink; hours of rest and sleep; ventilation of rooms;

personal cleanliness, for clean bodies and clean clothes lessen the chances of blood poisoning in accident cases; washing of hands before meals. The great advance in surgery that has been made in late years has come not so much from the washing of the instruments, the disinfection of the skin, the skill of the operator, but from the fact that the surgeon washes his hands. In order to prevent bacterial infection, the modern surgeon wears rubber gloves. Bacteria play a very important part in digestion, and for that reason washing of hands before meals is very important, as are also daily washing of feet, proper fitting of shoes, amount and kind of clothing, care of the eyes, ears, and nose, brushing of teeth, regularity of the bowels, the cultivation of cheerfulness—for the mind has much to do with the body and especially with tissue changes and secretion; and regularity of work.

The first condition of health is fruitful toil. Work is not a necessary evil; it is our greatest safeguard against disease and advancing old age. Some one once said to me that I looked young for my years, and wanted to know the secret. The secret of it is work. Many and many a day, and many and many a week, I have worked nearly every hour in the week. A country practice in my early life necessitated going out and working all day, thirty visits a day, ofttimes attending to my own horse, and then going out and spending the night with a confinement case—I have had as many as six confinement cases in a night.

The individual must be taught that definite results are to be obtained from definite conduct.

It is frequently asserted that a large percentage of accidents about plants are due to fatigue. From observation and inquiry it would seem that the greatest number of accidents are due to carelessness, some to ignorance, some to alcoholism, but some must be due to fatigue.

I wrote a little pamphlet on "What Causes Fatigue?" and my name is right under the title; my daughter jokingly read the entire title thus: "What Causes Fatigue? An Address by Thomas Darlington, M. D."

The second line of effort in the promotion of hygiene is sanita-

tion by employing companies. Under this head come those matters relating to health which must be worked out within the plants. Among these may be mentioned periodic physical examinations of employees; furnishing a wholesome supply of drinking water, with regulation of its temperature and method of distribution; adequate washing facilities; a sufficient number of properly constructed, clean, well lighted and well ventilated toilets; proper sewage disposal; good ventilation for the proper disposal of fumes, dust and smoke; clean floors and yards; proper methods of heating work places in winter and cooling them in summer; good lighting; provision for first aid; and possible consideration for lunch and rest rooms; proper hours of labor and periods of rest; and provision for club houses or reading rooms, lectures, playgrounds, recreation centers, planting of trees, flower gardens, visiting nurses, etc.

Then, third, is the question of sanitation under public authorities. I won't go into that, because of lack of time, but shall give just a brief extract from an address that I made before the Iron and Steel Institute. "After long and careful study, I find that the proper standard of health—and, therefore, efficiency— can not be maintained in the iron and steel and allied industries because of the lack of proper laws and the inadequate enforcement of existing laws by national, state and local authorities. Enormous sums of money are paid in taxes for which there is no adequate and proper return." So much for the factors bearing upon hygiene.

Now, a few words as to fatigue. In modern industry there is no question of more importance, so far as human activity is concerned, than that of bodily fatigue. To understand fatigue and the various factors of its causation, we must understand certain physiological facts. In the living body there is constant change. Whether asleep or awake, chemical changes are taking place. These changes are known as metabolism. We are constantly producing heat, whether we exercise or not. Did you ever stop to think that every one in the world has the same body temperature, ninety-eight and a half? No matter whether at the arctic circle or at the equator, provided a person is well, his temperature is ninety-eight and a

half. It is a wonderful piece of mechanism that keeps the body temperature at that point, and it is the chemical energy developed in the body that maintains that temperature. In the muscles particularly such chemical changes are constantly taking place, and they take place faster when the muscles are in action, that is, when the muscles contract. Every exertion and muscular contraction causes the expenditure of energy. Every muscle contains in itself latent energy in the form of fuel to be converted into mechanical energy and heat. Now, as to the fuel supplied to the body—I make this motion (indicating); I have lost something, what is it? What took place when I made that motion? Every muscle contains sugar. The chemical formula for sugar, or dextrose, is $C_6H_{12}O_6$. The dextrose was chemically changed, divided by two, and I got $C_3H_6O_3$; that is dextrose was immediately changed into lactic acid. This unites with oxygen from the blood until it is finally broken down into carbon dioxide and water and is eliminated by the lungs and the kidneys. In this way we get our muscular energy.

Now, a muscle is made to contract by stimulation. That stimulation comes primarily from the brain, secondarily from heat, from cold, from electricity or from other stimuli. When a muscle contracts, more oxygen is used than when it is at rest.

The materials for building up the tissues are carried to the various portions of the body by the blood stream; the oxygen is carried by the same means; and the products of waste are carried away by the same means.

The oxygen necessary for combustion is carried to the tissues, and carbon dioxide away from the tissues, largely by means of the red material in the blood, the haemoglobin in the red blood corpuscles.

The liver is the storehouse or coal-bin that stores up sugar in the form of glycogen, into which it is very readily changed. The liver contains a large quantity of $C_6H_{10}O_5$, which is delivered to the muscles as needed. The liver works something like a steam boiler or a gas engine. There must be fuel, there must be a supply of air containing oxygen; and there are the ashes as waste.

From this you can see that muscular energy depends very largely, First, on the amount of fuel stored and the ability of the system to bring it into use. Second, the ability of the system to furnish oxygen to burn the fuel, and, third, the ability of the system to carry off waste or other toxic substances. Conversely, therefore, fatigue is due primarily to the failure of the system to perform properly one or more of these functions. It is not due to work.

First, fatigue is caused by anything that interferes with the storage of fuel. There may be lack of fuel. Under this head would come under-feeding, improper feeding, indigestion of food, lack of assimilation of food. A person does not eat enough. It may be that a large quantity is eaten, but not of the proper kind or quality. Cabbage is an article of diet, yet it contains very little energy. Yet we find that the majority of workmen eat enormous quantities of cabbage. We should all study food values, and how and what to purchase in order to get the most and the best for our money.

Education along these lines, in connection with industrial plants, is best given in the form of household instruction by trained nurses or domestic educators.

It has been shown by a German investigator, Knoop, that we can change, in our system, one kind of food into another, but that puts a great strain on the system. Pavlov, a Russian investigator, has shown that the secretion of the gastric juice depends largely on the character of food and on appetite, and another investigator, that anything that interferes with our nervous system stops the secretion of the gastric juice and retards digestion. An examination of lunch baskets shows that very little thought is given to the contents of them, provided there is quantity. Many times the food in them, such as yeast bread, becomes sweated, and milk in the coffee undergoes more or less fermentation. This bears directly upon energy and fatigue.

After food reaches the stomach there is often much needless waste, particularly of the sugars, due to fermentation in the stomach. The sugars that go into the stomach are split up into

acids, and we lose the first chemical change. The fermentation is due partly to a lack of gastric juice, due sometimes to a disturbed condition of the gastric nerves, sometimes to a disturbed mental condition, anger, grief or worry, and sometimes to an excess of bacteria, which we get by eating bad foods. But the majority of people get it from unclean mouths. Once we started an investigation into pneumonia in New York, and we found that 70 per cent of the students in the medical college had the germs of pneumonia in their mouths. They did n't get pneumonia because the system was able to resist it, but the germs were there. Since that time I have been connected with a dental college as lecturer on hygiene. Investigation shows that the average mouth has some forty kinds of bacteria in it. Even more kinds of bacteria have been found in a single mouth. You put the food into the mouth and it goes down, carrying these bacteria with it. Why should it not ferment and spoil in the stomach? I hope the time will come when every workman, before he eats his meal, will brush his teeth; if he is to have energy he must do so. What is the use of sterilizing milk for babies or children, and then filling up the stomach with bacteria as that milk passes down through the mouth?

The conclusion to be drawn from this so far as fatigue is concerned, is that to combat fatigue from these causes it is well to have at plants, dining rooms, and restaurants freshly and properly prepared and well selected foods, furnished at the lowest practicable price, served under cheerful and pleasant surroundings, and with sufficient time to eat.

The second thing is that a lack of oxygen causes fatigue. You can not burn your sugar, you can not burn your lactic acid, without oxygen. Consequently fatigue is caused by anything that interferes with the carrying of oxygen to the tissues. This may result from a diminished amount of oxygen in the atmosphere, or from diminished carrying power of the blood. If you ever have your blood examined by a doctor, you will find that often he will say, "You are anaemic." Some people have a blood count of 2,000,000 red corpuscles; others have 5,000,000 red corpuscles; one

has twice the oxygen carrying power that the other has. Fatigue depends on this to a certain extent. The psychologist tries to show that it all depends on psychology. But take two people, if one is anaemic, the one with only half the red blood corpuscles can not be as efficient. You must remedy the physical condition first.

Diminished lung capacity should be considered, as in tuberculosis, or when induced by anything that interferes with the circulation of the blood, such as tight clothing.

Carbon monoxide in the air is a source of danger. Just as soon as there is any *CO* in the atmosphere, it takes fast hold on the haemoglobin in the blood, and renders the blood incapable of taking up oxygen. It forms a more stable compound with the haemoglobin than does oxygen, and it is very difficult to make the blood give up the carbon monoxide. Carbon monoxide and lead are the two most dangerous poisons in industry.

The third great factor in causing fatigue is poisoning by the accumulation of waste in the system. If you get too much carbon dioxide in your body, you get tired.

Mosso has invented a machine for measuring fatigue. He

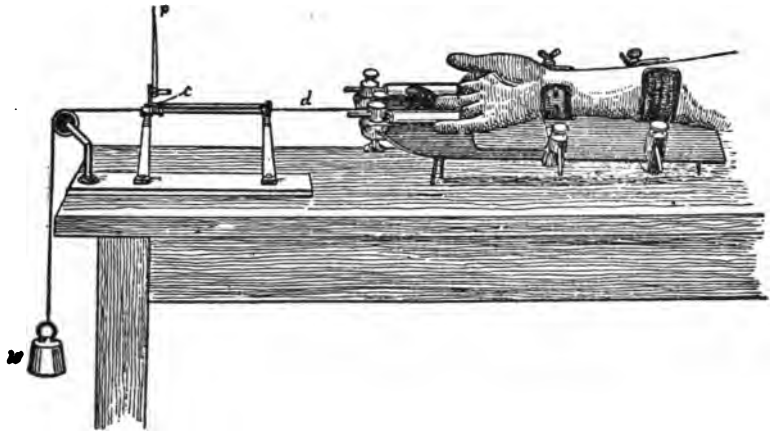


FIG. 1—Mosso's ergograph for measuring fatigue
(Courtesy of G. P. Putnam's Sons)

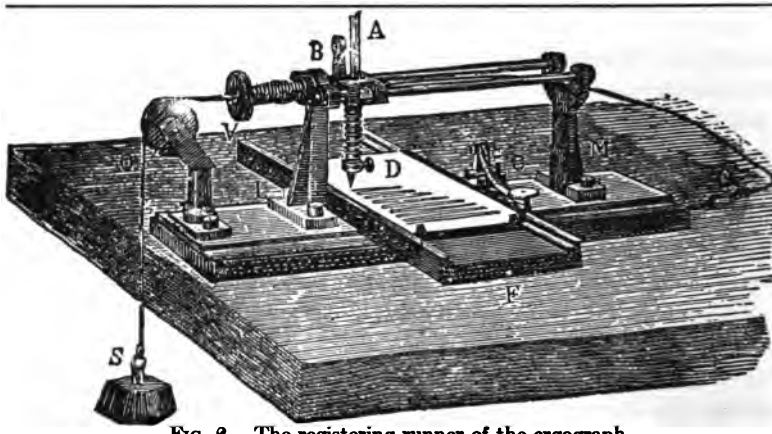


FIG. 2.—The registering runner of the ergograph
(Courtesy of G. P. Putnam's Sons)

noticed that when a lot of quails crossed the Mediterranean and came down on the shore, they were very tired. He examined some of them and found that their blood was full of carbon dioxide. He finally invented a machine for measuring fatigue, by means of which you can put your finger in the machine and keep your finger working under different conditions. The picture I show you is a machine used by Professor Lee of Columbia University.

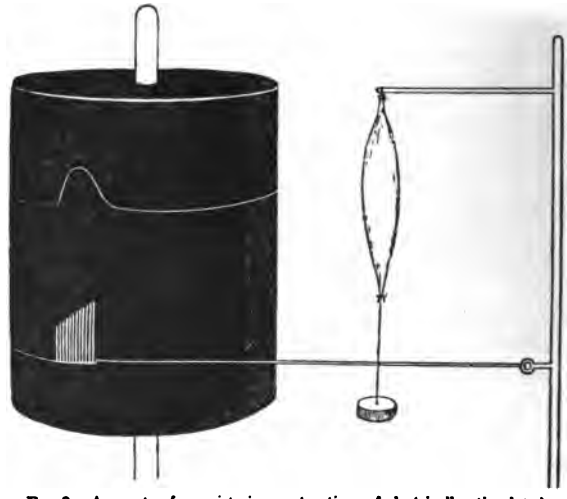


FIG. 3.—Apparatus for registering contractions of electrically stimulated muscle. *(Courtesy of Professor F. S. Lee.)*

Taking a muscle from the hind legs of a frog and placing the muscle so that it will be electrically stimulated, there will be a contraction which can be recorded. After many stimulations the muscle will contract less and less, until finally the muscle ceases to contract.

One of the first experiments that Mosso made with his ergograph was with a young professor who was giving his class the first examination. His record was taken before the examination, and after the examination was over they again took it and found that when he was mentally tired he could not work his finger well.

One of the first things that Mosso discovered was that, when an animal or person had exercised very freely, and you took the lactic acid and carbon dioxide from the tired muscles and injected it

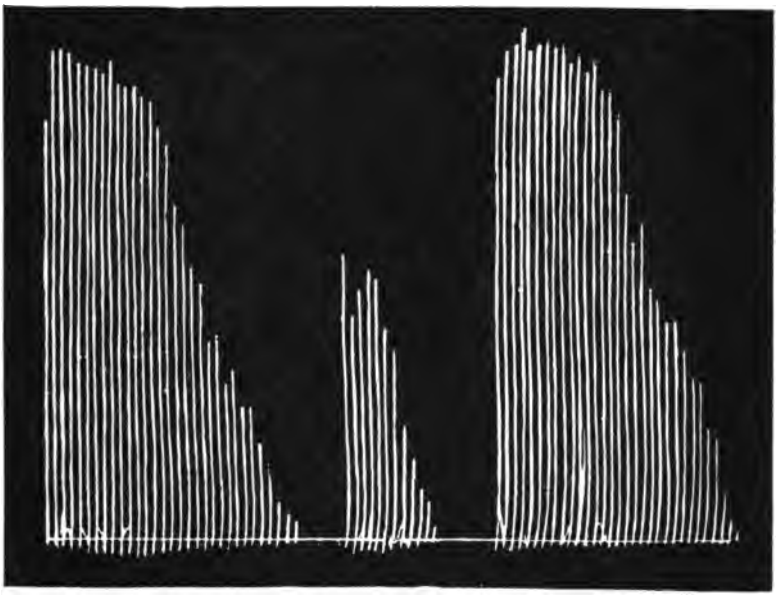


FIG. 4 FIG. 5 FIG. 6

FIG. 4.—Normal fatigue curve. (After Vinaj)
FIG. 5.—Fatigue curve of same after work
FIG. 6.—Same after cold douche, showing restoration to normal

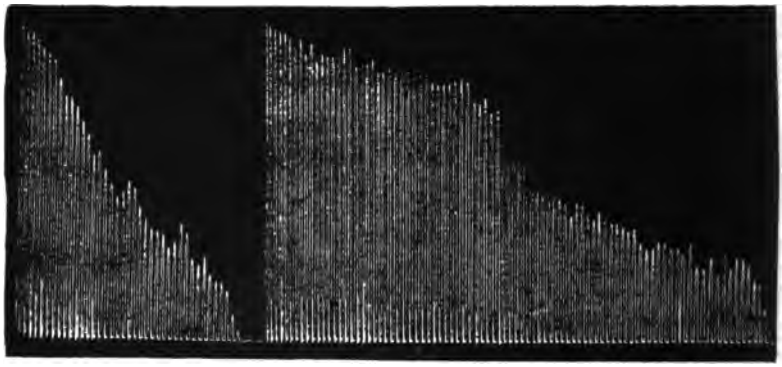


FIG. 7 FIG. 8

FIG. 7.—Normal fatigue curve of the hand. (After Maggiora and Vinaj)
FIG. 8.—Normal fatigue curve of the hand after a slowly cooled bath

into another animal, that other animal became tired. It is these toxins in the blood that make you tired.

Two Italian investigators, Vinaj and Maggiora, tried further experiments. They tried first this experiment over again with a man who worked hard, and they took his record before and after.

Then they immediately put him under a cold shower, starting the water slightly warm, and running it colder until he shivered, and took his record again.

In other words, he was more efficient after the cold bath than he was before he began to work, showing that cold shower baths lessen fatigue. You can see immediately how this bears upon installing shower baths in factories.

Carrying on further experiments, they took the normal record of one of the investigators himself:

Another investigator found that after a hot bath one was incapacitated for work.

I have not drawn it exactly to scale, but by measuring it up they found that this (indicating) was 8 and a decimal kilograms, and this was 5 and a decimal. It is possible from the diagram to calculate the exact amount of work performed.

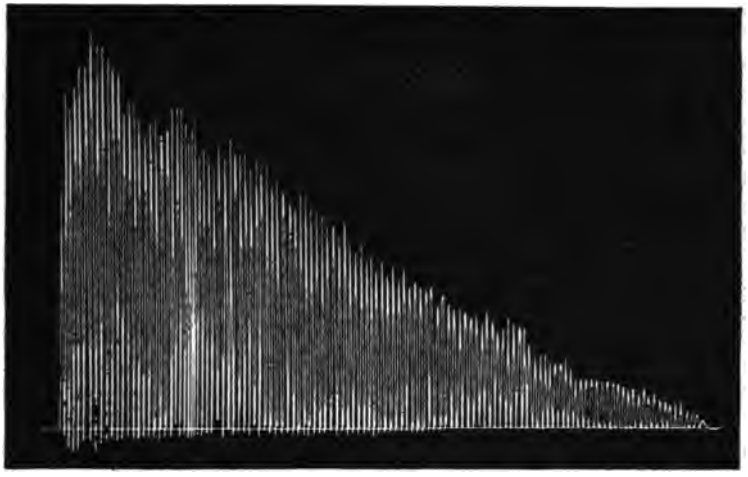


FIG. 9.—Normal fatigue curve
(Courtesy of Dr. J. H. Kellogg)

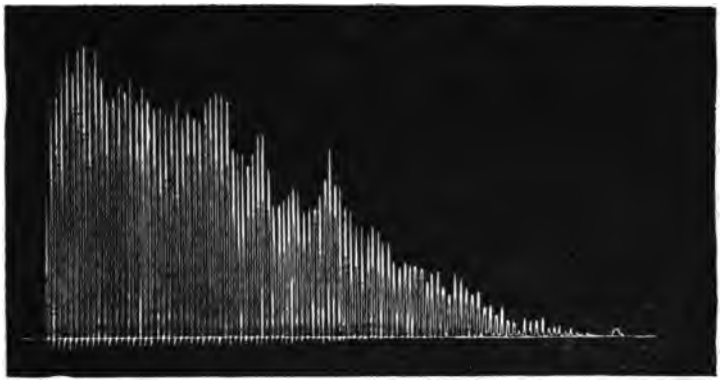


FIG. 10.—Fatigue curve, same subject, after a hot bath
(Courtesy of Dr. J. H. Kellogg)

Some further investigations, which are even more interesting, have been made recently in New York by Professor Lee. Take the two principal muscles from the legs of a frog. Into the one muscle inject with a hypodermic syringe a little salt and water. Then take

the record of the muscle, and you get something like the upper record of Figure 11.

FIG. 11—The upper record shows the normal fatigue curve of a muscle. The lower record shows the fatiguing effect of indol. (This illustration has never before been published and is shown here by courtesy of Professor F. S. Lee.)

That is, you get an electrical stimulation of the muscles. Now, into the other muscle inject the same amount of salt and water and some indol, a product of fermentation in the blood found in the faeces. Here is what we get. (Lower record of Figure 11.) In other words, the absorption of indol lessens the efficiency of that muscle two-thirds, cuts it down to one-third. What does that mean? It means that any man in a factory who has not a proper movement of his bowels is only one-third as efficient as if he had access to a good water-closet and his bowels moved regularly.

(A number of pictures on various subjects were shown with reference to safety appliances, and hygiene and sanitation with reference to drinking water supplies, wash rooms, bath and dry houses, lockers, toilets, pollution of streams and sewage disposal, drainage, garbage collection, stables; air conditions in both mine and mill (gases, ventilation and dust), first aid, hospitals, trained nurses both in mills and in the homes as social workers, making gardens, playgrounds and other forms of recreation, club houses, housing, stores, food, milk and dairies.)

In cleaning up certain mill towns, it seemed most important that the back alleys of the various houses be cleaned, because of the dirt and filth there; and inasmuch as flies breed in filth and carry disease, the opportunity was taken to write and have printed a circular which was sent out to the various companies. Six

hundred and fifty-two thousand circulars on the fly were printed in twenty different languages, even in Arabic.

Now, gentlemen, I have just touched upon some topics of welfare work, and particularly the reasons for it, trying to put it on a basis different to the philanthropic basis. Much is being done that I have not mentioned. These pictures only illustrate a few of the subjects and a small part of the work. The motto of the American Iron and Steel Institute is "Co-operation." It is on the seal of the Institute. There are many ways in which people can co-operate, and many reasons why they should co-operate in this welfare work. One of the reasons is because of the brotherhood of man. I was particularly struck by that while I was in the New York City Health Department. Among our laws, we had 187 that were all founded on one principle, "Thou shalt love thy neighbor as thyself." The man that loves his neighbor will not spit on the sidewalk, will not let smoke come out of his chimney to get on his neighbor's clothes; will not let the stench of a cesspool come to his neighbor's nostrils, will not keep a dog that barks at night.

Can we not have a little more of that real brotherhood, aside from the economic value of this work? It is a great fight that people are making today against disease caused by negligence, misery, sensuality. I have unlimited hope for the future, and an abiding faith in the people.

"I know that the problems that vex us now
Are sore to our errant view;
But we have gained the sight, and we have gained the might,
That our grandsires never knew.
We 've passed from the day when Might was Right
To the day when right reveals
Some part of her face divinely fair
To the veriest clod who feels.
Through the long slow aeons we 've upward crept
As ever our God hath willed;
And here has the right been crowned our king,
Or there has the wrong been stilled.
There is much to do, there is much to win,

But the ages have taught their lore,
And we clearer see what the right must be
Than ever man saw before."

Mr. Berresford, Vice-President American Institute of Electrical Engineers not being able to attend the meeting, sent the following letter which was read in response to the call for his address: MR. J. ROBERT CROUSE:

"I exceedingly regret my inability to remain at Association Island throughout the entire session, but it is essential that I be in New York tomorrow morning, and consequently I must leave tonight.

"It is my understanding that your purpose in inviting the representatives of the various electrical societies of the country was to familiarize them with the work which is being done and thereafter to obtain from them an expression of opinion as to the desirability of their association with the movement and the possibility of the various organizations participating therein.

"Naturally, my instructions from the Board of Managers at the American Institute of Electrical Engineers did not empower me to express the Institute's attitude, as there had been no opportunity to consider the matter. My duty therefore is simply to observe and report with such recommendations as may seem fitting.

"Personally, however, I may speak, and I hasten to assure you of my conviction of the desirability and importance of the work which you are doing and of the desirability and importance of the Institute's being connected therewith. It would be so in spirit, in any event, since its attitude is always that of co-operation, and it has, I believe, in many instances been the moving factor where co-operation was an essential. In view of the above I presume there is little need for me to indicate what will be the tenor of my report to the Board of Managers.

"I also desire to take this opportunity to thank you and your associates most heartily for the many courtesies shown me personally and through me to the Institute.

Electric Vehicle Association. Arthur W. Berresford.

CO-OPERATIVE ADVERTISING OF THE ELECTRIC VEHICLE ASSOCIATION OF AMERICA

By Frank W. Smith

MR. CHAIRMAN AND GENTLEMEN, because of the lateness of the hour I shall occupy but a very few moments of your time. As a matter of fact, the speaker was not aware of the fact that he was scheduled for an "address" until the printed program came to his attention this morning. I presume the thought was in the mind of the committee in charge of the arrangements that it might not be inappropriate for the Electric Vehicle Association of America to say a word as to the publicity campaign which the Association has been conducting for the past year.

Our Association has been trying to do in a very small way for the electric vehicle what The Society for Electrical Development hopes to do in a much broader way for the electric industry generally. Perhaps a very brief sketch of what we have already accomplished and what we hope to do through another year may be of interest.

A national co-operative educational campaign was inaugurated by the Association in the early spring of 1912. A campaign fund of some $42,000 was raised by the Association, the contributions being numbered among the central station interests, the electric vehicle manufacturers and, as well, the battery and accessory manufacturers. The central station interests contributed 58 per cent of the total fund, the battery and accessory people 31 per cent, and the vehicle manufacturers 11 per cent.

The Publicity Committee, of which the speaker has the honor to be chairman, published and presented at the annual convention

of the Association held in October last, full and detailed report as to the conduct of the campaign up to that time, and to any one interested a copy of this report will be gladly mailed.

The result of the campaign, which for the past year was, of course, entirely educational in its advertising copy, may be summed up as satisfactory, inasmuch as those who have contributed to the fund have generally expressed that view. The work of the Association I think has been particularly productive of good results as between the central station interests and the vehicle manufacturers, and it has been said that to some extent at least the Association is responsible for the material increase in the use and adoption of the electric vehicle to promote which the Association was originally formed.

At first there was considerable criticism of the central station for its lack of interest in the vehicle propaganda, but the fact that the central stations are the largest contributors to the fund speaks for itself, and much has been done by the Association to bring together these two interests.

Replies were received, as a result of the advertisements, from twenty-eight foreign countries, and a number of applications have been received from remote quarters of the globe.

The Publicity Committee is now soliciting subscriptions for a second year's campaign. So far there has been contributed upwards of $34,000, which is within $8,000 of the amount received for the first year. It is interesting to note that there are forty-three new subscribers who did not participate in the first year's campaign. It is also disappointing to state that there are to date forty-one subscribers to the first year's campaign who have not subscribed to the second year. A number of these are because of consolidation, or in the manufacturers' field, some have discontinued business, but there are still a number who should support the movement for a second year.

To some extent the work of The Society for Electrical Development may have influenced some of these contributors, although it is fair to say that most of the larger contributors who are supporting the movement of The Society for Electrical Development

are also supporting our movement, which shows that they are co-operators in every sense of the word. As a matter of fact, Mr. Doherty was one of the first to subscribe to the vehicle publicity campaign for all of his companies.

The suggestion was made at the outset that our Association might see its way clear to take part as an association in the work of The Society for Electrical Development, but it was found that we had gone too far, as our second year campaign was all ready to launch, and we had obtained a large sum toward the fund necessary which could not be very well turned over to The Society for Electrical Development.

In our advertising the use of a slogan was adopted, namely, " Before you buy any car consider an Electric."

The plans of the committee for the second year include a better follow-up system on the inquiries. Two very handsome booklets will be published; one, *The Story of the Electric Pleasure Vehicle*, and another, *The Story of the Electric Commercial Vehicle*, and all of the advertising copy will include a " puller " for these booklets which will be mailed to all inquirers, whose names and addresses will be at once transmitted to the manufacturers who are contributing to the fund.

There are many interesting points and details, but I shall not trespass upon your time further. I believe the Electric Vehicle Association has been very helpful to the industry, and from what we have done in a relatively small way along the lines of a co-operative advertising campaign can be done to a very much greater extent by The Society for Electrical Development and I commend that movement to your serious attention.

CO-OPERATIVE ORGANIZATION OF THE ILLUMINATING ENGINEERING SOCIETY

By Mr. Norman Macbeth

I UNDERSTAND that one of the questions that the various representatives of the societies here had to pass upon was the possible success of this meeting, and I assure you that I appreciate very much the privilege of carrying a message back to the Illuminating Engineering Society as to what we have experienced here these past few days. In view of the remarks that have been made by some of the other speakers regarding the position that lighting takes in the field generally, it is also a pleasure to realize that this island and all that it stands for was, I understand, stimulated by the men in the lighting end of the business.

There was a little illustration I wanted to bring in here of this change in what the word lighting stands for. At the recent convention of the National Electric Light Association in Chicago one afternoon I sat next to a gentleman who told me that he was manager of the lighting department with a certain large manufacturing company. "Then," I said, "you are well acquainted with"—some half dozen lighting men whom I mentioned and whom I knew very well, men who had been active in the design and layout of lighting installations in stores and in the work shops in various industries. He said: "No, I don't know—Oh, yes. So-and-so is in the incandescent lamp department and others were in the arc lamp department." "Well, tell me," I said, "just what is your work?" "My business is selling apparatus to central stations," and I had to promise him that we would endeavor to have the name of his department changed, as he was not in the lighting business.

There is also another matter on which a great deal of misunderstanding exists. I refer to the Illuminating Engineering Society. It is one of the big co-operative organizations of this country. It is not a society of illuminating engineers; in fact, the membership will show less than one per cent of practicing illuminating engineers. It is a society to provide for a closer co-operation on matters pertaining to the use of light among laymen as well as professionals; among electrical engineers, gas engineers, architects and designers of fixtures and glassware; to point out in what way the best illumination results may be obtained from any source of light. For instance, last week one of the most important conferences held in this country for some time just closed in Buffalo, an International Conference on School Hygiene. Two sessions of that conference were taken charge of by representatives from the Illuminating Engineering Society, and I understand that they were the best attended sessions of the entire congress. The papers presented had to do with considerations of lighting in schools and the effect of various lighting arrangements on the eyes of school children.

The point made by Dr. Steinmetz that co-operation is not a sentiment, but an economic necessity, has been very well realized by the Illuminating Engineering Society. One of the first questions raised was whether it would be possible for the diversified interests in the lighting field to get along together and not fight, but they have, and the working together for a better general understanding of lighting conditions has resulted in a great deal of good work being put on record. The transactions of the Society now number something like six thousand pages, and it is only a few years since they were started and a great deal of very valuable matter is there available, which without the Society I do not believe would have been available elsewhere.

In connection with the publicity work, the issuance of a "Primer of Illumination," of which many thousands have been distributed, has marked a very excellent beginning in that field.

There is another committee that has been under way now for five or six months, and very shortly we will hear from them. That

is the Committee on Popular Lectures. They are compiling lectures on various subjects, which will appeal to these particular interests concerned with illumination.

In the paper given by Dr. Darlington many indirect references were made to show the importance of lighting to the welfare of the workers in all the industries, and as Dr. Darlington said that welfare work pays, so also I may add does good lighting pay. The Committee on Factory Lighting Legislation drafted and submitted to the New York State Factory Investigating Commission recommendations which were adopted and placed in a bill passed by the New York Legislature last year requiring adequate lighting in all factories and other workrooms in New York State.

There was one other excellent point brought out here, by a speaker, that so far as the general appreciation of your problems by the public is concerned, it is desirable to have many of these well known matters taken up in colleges, that the students may be given the latest and best information on these many points which are today, although well known to you, new to the faculty of our colleges.

We have a Committee on Collegiate Education that is getting in touch and is working close to the colleges, advising them on the starting of courses in illuminating engineering or helping and coaching them in these courses.

A central station official who is in this room, on an occasion a year ago when he was reciprocating, gave it as his opinion that the Illuminating Engineering Society has done more to stimulate interest in modern hygienic lighting, which has done so much more to increase the central station business, than any other influence. The Society has done a great deal in educating the public how to get three hours' use and pleasure from lighting, where formerly one hour's use, between snapping off of switches, rendered but a partial satisfaction in their use of a so-called luxury.

There is no doubt in the minds of those in touch with the situation that central stations will find an excellent opportunity in the Illuminating Engineering Society and an ideal weapon for

combating the isolated plant. The development of the central station valley has gone along to such an extent that the lighting hours are now, in some localities, the valley. Surely some central station man will note this condition on his load curve and will make an effort to develop the profit taking lighting load and at the same time correct the poor load factor due to the industrial installations. Lighting has also been and may be satisfactorily used as an entering wedge for all the other kinds of so-called profitable service.

THE PUBLIC AND ELECTRICAL DEVELOPMENT

By D. L. Gaskill

MR. CHAIRMAN AND GENTLEMEN, I bring to you the greetings of the central stations of Ohio, and wish to assure you at the start that the Ohio Electric Light Association, the largest state association in the United States, stands ready with its means and with its men to co-operate in this work of electrical development. I have been more than delighted, not only at the royal entertainment, that has been given to us as your guests, but with these wonderful addresses we have had here in this room. No man can go home from here without being a bigger, better, and a broader man. When you have accomplished that at a meeting, you have accomplished something that has made the world better, and it is worth all that it has cost.

Now, this electrical development has a good many sides to it, and we have heard it from different angles. I certainly admire the master hand that planned this program; and while we have been listening to splendid addresses on various subjects, yet at the foundation of every address lies the fundamental cornerstone of Co-operation, Mutuality, Reciprocity—that was a wonderful phrase that was coined last night by the author who is with us, and I felt that when we went home we would go with co-operation as our watchword, and would accomplish something in the next year along this line.

Now, the best method of obtaining co-operation has been discussed. I certainly have enjoyed very much hearing Mr. Doherty, and, like him, I can't agree with the great liberality of the State Commissions, and yet I feel that the State Commissions are the one necessary thing for us to have. And while we have them, they need the assistance and co-operation of the public, and it is up to

us to educate and to bring about that co-operation on the part of the public. The central station man gets the idea that there are only three kinds of people in the world, one is the politician, another the public, and the other the central station man, and if you leave it to him he will apply a fly-swatter to the politician first, he will educate the public, and then we will find our road much easier.

There is one cloud upon the horizon of commission control, which some of you probably have n't recognized yet, and I want to say that within the next five years we are going to have a great deal of trouble with it. The politician has seen in state control of utilities his principal political asset going out of his hands, and he is now very subtly trying to get laws passed providing that where cities adopt a charter, or where they are of a certain size, or have some other distinguishing qualification, such cities shall have the right to appoint their own utility commissions, with the same powers as the State Commission. That is worse than the old municipal control, where the council had so much to do in other affairs that they did n't have much time to devote to the public utilities. When you have a body picked out of local politicians, clothed with all the powers of a state commission, the old adage that "Satan finds some mischief for idle hands to do," will be made painfully evident. Over in Illinois, Carter Harrison, Mayor of Chicago, tried to get the Governor to veto their utility bill because Chicago did n't have the right to have its own utility commission, and I saw a statement some time later that he would try to have the bill amended at the next session of the legislature. I anticipate that this movement is going to spread all over the country, and it is up to us to educate the public through The Society for Electrical Development, and other means, so that they will accord us fair treatment.

The public is not a bad friend, nor is it against the utilities. If you will lay before the public fairly your conditions, it will be fair to you. Some of this trouble is all our own fault: we have hid our light under a bushel, we have prevented the public from knowing anything about our business, and now we find we need

Societies for Electrical Development and other means to educate the public so they will know what we are doing.

The best means of bringing about this co-operation is hard to determine at one meeting. It must come about through joint and co-operative action on the part of many associations. I suggest to the other representatives of state associations who are here, that we promise and pledge ourselves during the coming year to devote one session at least to the subject of Co-operation. I believe it will have a good effect. You want to interest the little fellow, and he is a hard one for an organization in New York or Chicago or other great city to interest. He thinks, "Oh, well, I can't trot in that class." The only way you can interest him is through his own associations, where he is at home and is not afraid to get on his feet and talk on the subject. You will have to do that through his association, and there is no better way than for some one to lay out that program, and on behalf of the Ohio Association, I pledge you one session at its next convention along these lines, if you want it.

There has been something said here about the means and methods of co-operation. Everything that has been said has been good, but there is one thing that I have n't heard that I wish had been talked about, and that was the policy of interesting public schools in the matter of electrical development. I believe it is the one place where you can accomplish most, if it is gone at in the right way and pushed. We all know that the easiest way to accomplish something and the way to make it stick is to educate the coming generation to do it. I had a little illustration of that just two years ago, in one of the State Universities of Ohio. We had a large main building in which was located the domestic science department, in which were instructed students that came there to be prepared for teachers. That old room was fitted up with gasoline stoves; it was an old college town that has no gas. It was up to me as one of the trustees of that institution to see that we got a good, safe method of cooking. I immediately installed electric ranges throughout, and for two years we have been educating those teachers to teach cooking on electric ranges. The

president wrote me a short time back that he had had ten inquiries from Boards of Education where these teachers had gone out, asking how much it would cost to equip their domestic science departments with electric ranges. I hope the public school will not be overlooked by these publicity managers who are seeking to advance the cause of co-operation. The way we teach electricity in the public schools it is no wonder that the boys and girls of today know nothing about it. Take the films we had the first night we met here, if we could have that series of films exhibited in all the schools of the state, you can see what you could accomplish in education along the line of the use and science of electricity. I recollect, when we took the subject of physics, as we called it, in college and in high school. I am always amused when I think about taking it in college. There were ten in the class, and we had a professor of national reputation, but he taught the subject in the old way, and at the end of the first term two of the ten "flunked" in the subject of electricity. After it was over they went down by the side of the old spring and agreed that it was a "hell of an examination." Those two boys have been attending this meeting; one of them is one of the vice-presidents of the General Electric Company, and the other is the secretary of the Ohio Electric Light Association. It probably spoiled us; we might have been in honest co-operation if we had been taught differently.

I feel that this meeting will be of great benefit to us all, and I am only sorry that every state association is not here represented. I shall take home to Ohio a good word for the co-operative movement, and I pledge you the assistance and support of the Ohio Electric Light Association.

CO-OPERATION AMONG MANUFACTURERS

By Mr. S. O. Richardson, Jr.

GENTLEMEN, as the hour is getting late, and I am afraid it will take too long if I speak extemporaneously, I am going to read you just the object and the purposes of the Electrical Manufacturers' Club.

The Electrical Manufacturers' Club was organized a few years ago with the object of exchanging ideas along the broad lines of manufacturing, and by thus co-operating putting their business upon a better basis.

It has considered such matters of importance as the proposed revision of the patent laws, standardization of materials, and approval by the board of underwriters, and is now considering welfare work in their workshops, and profit-sharing.

It was honored last year by an address by Dr. Eliot, President Emeritus of Harvard University, along these lines.

From our experience we are in favor of co-operation throughout the industry. We have carefully considered the plans of The Society for Electrical Development, have been addressed by its leaders, and some of us have discussed its plans.

It is our opinion that the use of electricity can, by this Society, be increased more rapidly, to a greater extent, and with less expense to each, than in any other way. We are therefore in favor of it.

In this connection it has occurred to me that a subject has been neglected that I would call "Welfare Publicity." It is to explain to the masses of people more about the cost of development and maintenance of electric plants and apparatus.

A very small number of the users of electric current have any idea as to its cost and in most cities the masses have been led to believe that the rates are exorbitant and unreasonable, and are therefore against the public service corporations. Some of you who

COMMODORE S. O. RICHARDSON, JR.
(In Island Native Costume)
President Association Island Corporation

have been before councils, or county committees, on a franchise or rate question, have really made an impression as to the justice of your position. You obtain no results, as these men are mostly politicians who are elected by the people upon a platform that is against you.

The trouble is that the people do not get the facts, their information usually coming from a newspaper, which, to increase its circulation, has made an attack upon you.

Public advertising to counteract this, as tried in some cases does very little good, as the people do not believe these paid ads.

The information must be placed before them as reading matter, as articles of news, and it will then make the impression.

Take a story of the development of the tungsten lamp, the expense of the first lamp, the time taken to produce the tungsten wire, and the great amount of good the people have received from the increased light at low cost; the power station, the amount of apparatus necessary to provide for the peak load, the rapid changes that are required to keep up with the development, etc.

All these seem to you simple, but it would make very interesting reading to many.

These facts in the public mind will make a change in the feeling, and would make many think before voting for municipal ownership.

Within the next year, owing to the policies of the present administration, many changes are liable to be made in our business conditions. The electrical industry can legally help its position by a thorough plan of co-operation, regardless of reductions in tariff, attacks upon corporations, or patent laws.

It is for this reason a society, embracing all phases of the electrical industry, that will act along the true principles of co-operation, will not only place us in an impregnable position but in the end will do much good for the entire country, by furnishing the people with the highest quality of goods at reasonable prices and give steady employment to American workmen at fair and honest wages.

MUTUAL UNDERSTANDING OF INDUSTRIAL PROBLEMS

By Mr. W. E. Robertson

MR. CHAIRMAN AND GENTLEMEN, I have been asked to speak for the jobbers, the electrical supply jobbers, of the country, in appreciation of the good that the jobbing industry has received through the meetings that have been held on this Island through the propaganda of the gospel of co-operation.

The thing that strikes me as being first in importance in influencing the jobbers is an understanding of the problems of the other branches of the industry. For instance, I think the bitterness that once existed has been practically entirely eliminated. The National Electric Light Association, through the Commercial Section, a year ago placed a jobber on its executive committee, also a member of the Contractors' Association. Through committee work in which not only that jobber but other jobbers have taken part, a better understanding of the position of the central station industry of the country has been arrived at, and today we ask only to understand what is inevitable in the development of the industry, in order that we may adjust ourselves to the changing conditions.

At the meeting of the National Electrical Supply Jobbers' Association next week, the chairman of the Merchandising Committee of the Commercial Section of the National Electric Light Association will present the paper that was presented in Chicago, because that paper shows the sincerity of purpose and care with which the facts were accumulated with reference to the merchandising of supplies and apparatus on the part of central stations. Through this mutual understanding, through this co-operative

work, we are coming into closer fellowship with the industry, we are reaching out and are willing to co-operate in plans that are for the good of the entire industry.

I personally have been at the Island on a number of occasions. I have never come here without getting ideas, without hearing things expressed which have been of inestimable value to me in broadening my horizon, and tightening my grip on the situation as it develops. I have tried to the extent of my ability to carry the message from these meetings to our society, and I know that today the jobbers, while not many in number, while not operating large sums of capital, are yet an aggressive force in the industry, and are willing and anxious to co-operate in every way with the co-operative movements that are here launched.

PROGRESS ALONG LINES OF CO-OPERATION

By Mr. E. McCleary

MR. CHAIRMAN AND GENTLEMEN, I want to bring you a message from our president, Mr. Freeman, expressing his extreme regret that conditions have developed which prevent his being with you. The prime reason for his not being here was the lockout which prevailed in Chicago not so very long ago, and his being a member of the executive committee of the employers of the building trades has made it necessary for him to remain in Chicago.

I voice all that Mr. Robertson has said, or at least wish to endorse it. My understanding of the addresses of the elective heads of the various associations is that we are not to enter into our own troubles, but to tell you our opinion of the results that are bound to take place as the outcome of meetings such as these meetings here. And I can only say that after listening to the words of Mr. Fish this morning, in which he touched upon one subject in which our people are naturally interested, and that is the question of marketing, where he expressed the opinion that fixing the prices for the consumer was right and justified, and that the fixing of those prices meant the elimination of competition between the jobber and the dealer and the contractor as a natural result, I believe under proper conditions this would be right and justified, and speaking for the contractors I want to say that when the time comes that that condition can actually prevail, we are with you and for it to a man.

I can't help but notice or at least think of the progress that has been made along the lines of co-operation by many associations since the meeting on this Island of a year ago. We have progressed rapidly. We have accomplished in the past year something that

we never have done before. For the first time in my history, during the year that has intervened, our President, on the solicitation of the jobbers, has met with them at their convention held in Chicago and talked with them of our position as related to them. We in turn have been honored by having a representative of the jobbers talk to us at our last annual convention in Chattanooga—and it was one of the best talks we had, one of the most interesting subjects that was before us, and one of the best individual speeches that I have ever listened to; and I have yet to find a contractor who was at Chattanooga who did not absolutely agree with the speaker in the deductions he made at that meeting. That, gentlemen, represents co-operation.

I stated to you a year ago in this room my understanding of the other fellow's problem. I set it out probably in rather an unusual way, but it was my way, and I was here seeking information as to the other man's position. Whether the results of that meeting and its inspirations have borne fruit or not, I can best show in correcting Mr. Wakeman by saying the contractors are not second; according to the reports made here today they are first in numbers; in other words, there are more contractors who are members of The Society for Electrical Development today than there are members from any other branch of the industry, and that shows that the contractors will co-operate.

I believe that the remarks made at last year's convention and the work of the year have borne fruit. We are with you, and I want to say it is a blessing for the electrical fraternity that we have a body of men such as the Association Island Corporation, who were capable of conceiving this thought and carrying it through to the successful conclusion. Its success is proven by the gentlemen at this meeting. I want to thank you for the contractors and personally for the privilege of being with you, and to pledge you our best and fullest support.

HARMONIZING LOCAL ELECTRICAL INTERESTS

By F. E. Watts

MR. CHAIRMAN AND GENTLEMEN, I suppose it is only a natural result that a man who is actively engaged in the work of any organization comes into a greater realization of the possibilities and needs of the organization. During the past year the work which it has been my privilege to do in connection with the Jovian Order has brought to me the realization of the possibilities and needs of that organization in furthering co-operative electrical development. With your permission I want to point out some of these possibilities today, and one of the needs in particular, without going into details as to why they are possibilities, because I know you will agree with me that they are.

One of the first things which we must do in this co-operative work is to harmonize the various electrical interests in each locality. We can solve, for instance, the problems peculiar to the electrical business of Cleveland, by getting the various interests represented in that city together on a more friendly basis, but this work must be done by the electrical men in Cleveland, and can not be done for Cleveland by any other city, and there is no better way of getting these men together than by means of local Jovian leagues of electrical interests. It has always been my belief that where men at stated periods break bread together, they are sure to become better acquainted and closer friendships are established, and out of these friendships is bound to develop more harmonious relations in the business in which we are engaged. When these relations have been established and men believe in one another a little more, and understand each other better, they are then ready to take up plans for practical commercial co-operation in that locality. We may plan many things in this meeting for betterment

of our industry along these lines, but the actual work must be done in each city, and the problems of conflicting interests settled there by the men on the firing line. The solving of this problem lies entirely within the scope of the Jovian Order, and is one of its greatest possibilities for usefulness.

Another possibility of the Jovian organization is to take up just such work as we are doing today in behalf of The Society for Electrical Development. It is the first opportunity we have had to take up a problem which is nation-wide, and we are able to demonstrate the power of the Jovian Order in focussing on something that is concrete, and which will produce results beneficial to the electrical business. While we should have liked to have more time to educate the members of the Order in the plans and scope of the work of the Society, nevertheless we are going to do the best we can to secure the subscriptions necessary to start the actual work of the Society.

This same force of the Jovian Order may be applied in the solution of other problems, which may arise and which affect the electrical business—for instance, legislative affairs. The influence of the Jovian Order may be directed against such legislation as is detrimental to the electrical business, whether it be local, state or federal; and also may be made a means for the enactment of such laws as are necessary to develop the business along proper lines.

Another one of the possibilities is this. We have had more or less discussion about the education of the public with reference to public utilities, and it seems to me that this education, like charity, ought to begin at home, and our first duty is to educate the rank and file in the electrical business as to the rights and privileges of public service corporations and the things which they are trying to accomplish. There is no place where this can be done to a better advantage than in the Jovian Order. Tell the men gathered at local Jovian meetings of the questions and problems which confront the Public Utilities Company and which we have discussed here. I believe they will understand these problems, and that they will be as potent a factor in educating the public as any

one thing we can do. Did you ever stop to think that there are very few individuals in the United States who do not know personally some man in the electrical business. A great many of these electrical men are members of the Jovian Order, and if we can educate these men, who are on the firing line and in contact with the public in the problems of the Public Service Corporation, they in turn will pass this on to their friends and neighbors, with whom they associate daily, and much unfriendly criticism will be avoided. This educational work of our own men I believe to be worth while, and I am sure can be accomplished through the Jovian Order.

The Order is having a wonderful growth, and I want to point out as an instance of this growth that in the month of February this year more men were made members of the order than during the first eight years of its existence. Today we have over 12,000 members, and I make the prediction that in five years from today we will have 25,000. In the past the organization has been largely directed by a few men of executive ability, but real enthusiasm, the thing which has kept the order alive, has been that of the rank and file in the electrical business.

The greatest need that we have today in the order is for more men of the calibre of those in this meeting to take up actively the work of the Jovian organization and give it their support. We need men of executive ability to direct the work which we hope to accomplish, and this work properly planned will be carried to a successful conclusion by the great rank and file of the order.

In conclusion I want to say just a word regarding meetings of the nature of the one which we are holding here. The greatest accomplishments in the world's history have been brought about by the enthusiasm which has been generated back of them, and in a meeting of this kind where men discuss frankly the great problems which face us in the electrical business, our enthusiasm and faith in the business and its development through co-operative effort will be strengthened and we will go forth as better converts to the principles of co-operation. The close relations, among the leaders of the industry, which will be established through such means as this, will be productive of beneficial results to the

industry far in excess of any cost that may be incurred, and this in itself is sufficient reason for making this an annual affair.

MOTION FOR VOTE OF THANKS TO VISITORS

By S. O. Richardson

Gentlemen, in closing this most satisfactory meeting, I wish to first thank Mr. McCall for being your presiding officer. I wish to thank you all for coming here. I know you have profited by it. I hope you have enjoyed yourselves and that you will come here again, for you will always be welcome to our shores. We have been honored, and have enjoyed the many most interesting addresses, and I move you, Mr. Chairman, that the speakers be given a hearty vote of thanks for the instruction and pleasure they have given us.

The motion was seconded and carried unanimously.

MOTION FOR VOTE OF THANKS TO ASSOCIATION ISLAND CORPORATION

By J. E. Montague

Mr. Chairman, we are greatly indebted to Association Island Corporation for this highly interesting and profitable meeting, and I move you, sir, that a hearty vote of thanks be extended to the Association Island Corporation for the splendid work done for the electrical industry through this meeting, and for their wonderful hospitality.

Mr. B. M. Downs seconded the motion as follows:

I think I would be lacking in my duty if I did n't say more than "I second it" to Mr. Montague's motion. As an individual, as a member of the Manufacturers' Club, and, better than all, as a member of The Society for Electrical Development, do I appreciate it, and therefore my appreciation is threefold. I think we are indebted to the Association Island Corporation for the opportunity they have afforded us to listen to the addresses given by the very eminent men who have spoken here. We must all go away with the knowledge that this has been an absolute success as a meeting for the whole industry. I therefore most heartily second the motion.

APPRECIATION OF CAMP CO-OPERATION

By Mr. W. A. Layman

This is my first visit to the island, and, after four days of the highest pleasure, I wish to say the occasion marks the high-tide of hospitality, and in this spirit I want to second this motion.

The motion was carried unanimously.

CLOSING REMARKS

By Chairman J. B. McCall

Before closing the meeting, gentlemen, I want to personally thank the members of this Association for the kindly treatment I have had here, even if you did have to take the bars down to give it to me. I have been attending conventions for a good many years, and have presided over many of them, and I don't think I was ever at a convention with a list of subjects handled by such a list of speakers as you gentlemen have had at this meeting, and certainly there must be some lessons we can learn from our experience of the week.

In the first place, the thought occurs to me—the thought of education having dominated somewhat—that practically 95 per cent of the people who have been present during the last two or three days, are members of the industry. Outside of Senator Howland and Mr. Hubbard, Mr. Vanderlip, Dr. Darlington and Mr. Roemer, I think every other man here is associated in the business of electric lighting and power in one way or another, and I think they have been educated. These live wires that belong to this Association, who come here and prove that men who work hard can play hard, ought to carry out into the world the thoughts which have been driven home here in the last two or three days.

The principal things that occur to me in these addresses have been the relation of the government and the financier to our industry. From what Mr. Vanderlip says, the securities of our industry are better appreciated and can be better marketed under government regulation than in any other way.

And then another thought occurred to me in connection with it. We men have been sort of tagged, for a good many years, with the sign that we don't know how to treat our market properly, and

that because of our actions we have to be regulated. As I look at the situation, that is not altogether the truth. It does not represent what naturally and finally demanded that we should be regulated. The history of the business proves that in the early days the gift of franchises was made because nobody thought they were worth anything, and men had to keep themselves poor and sometimes make enemies of their neighbors by getting money from them in order to push this business to a successful result. Just as soon as they got it to that point it became in a measure the prey of almost every political party in every community. Whenever there was a change of political faith, or a change within the organization, after this business was developed it became the right, apparently, of the new ones to grant someone a franchise which was ultimately sold to the existing company, and abuses gradually arose out of that condition. Those abuses have more largely led to the necessity for regulation than anything else, in my judgment, and I think it is time for the members of our industry, all the live, active fellows who get out into the world, to try to down the idea that we had to be regulated because, for some reason, we were not as good as other people. That is not the fact, and I hope the men of this organization will combat that idea. The electrical man has had just as much respect for his market as the farmer or the merchant, and I believe the percentage of complaints is less than in any other industry in the country. I want you also to carry away the thought that we can live under government regulation, and that if the financier feels better about it we are benefited by it, We only fear the interpretation of that law and the fact that it might get into the hands of local politicians, to our detriment. Our best people ought to get in touch with the commissions and educate them in every possible way. I am glad to have been here. I thank you, gentlemen.

"DO IT ELECTRICALLY"

AIMS AND BY-LAWS OF THE SOCIETY FOR ELECTRICAL DEVELOPMENT, INCORPORATED

The particular objects for which this corporation is formed are: To promote and increase the use by the public of electric current for all useful purposes as an end in itself and as a means for increasing the demand for apparatus and supplies; and to promote and facilitate a co-operative planning and execution of various means and methods effective to this end; to encourage and promote the development of the electrical science, art and industry, both technical and commercial; to develop means and methods tending to promote the welfare of individuals identified with all branches of said business; to encourage harmonious relations which will assist in maintaining the industry in the highest confidence of the public; to establish co-operative relations among the different electrical interests, from manufacturer to consumer, to the end that each may contribute in some measure toward bringing about the aforesaid results desired by all.

BY-LAWS OF THE SOCIETY

ARTICLE I—MEMBERSHIP

SEC. 1. Any individual, or any person as a representative of any firm, corporation or association, who or which is engaged or interested in the manufacture, production, installation or sale of electrical or other apparatus or supplies necessary to the production, distribution or utilization of electric current, or who is engaged in the manufacture or sale of electric current, wishing to become a member of this Society, or to be represented by membership therein, shall file an application of membership, duly signed, with the Secretary-Treasurer. Such application shall be presented to the Executive Committee at its next meeting, and if approved by vote of the majority of those present at such meeting, such individual or such representative shall thereupon become a regular member of the Society. The refusal by the Executive Committee to elect an applicant to membership shall be subject to review by the Board of Directors, which may, after such review, elect such applicant.

(a) Any such firm, association or corporation shall have the right at any time to designate a new person to represent it in membership, subject to the approval of the Board of Directors, and must do so in case of the death, resignation or expulsion of any representative of such firm, association or corporation.

(b) HONORARY MEMBERSHIP. Any person who shall have rendered conspicuous service in the promotion of the electrical science, art or industry, either technically or commercially, may be elected to honorary membership in the Society. Election to honorary membership shall rest exclusively in the discretion of the Board of Directors and must in each case be by unanimous vote. Honorary membership shall continue in effect until termination by a like vote of the directors. Such membership shall pay no dues and shall have no vote in the meetings of the Society.

MEETINGS

SEC. 2. Regular meetings of the members shall be held annually

at the principal office of the Society in New York, at 11:30 o'clock in the forenoon on the second Tuesday in May, for the purpose of electing directors, and for the transaction of any other business that may come before the meeting. In case such Tuesday shall be a legal holiday, the meeting shall be held on the next succeeding day which is not a legal holiday.

(a) Notice of the annual meeting shall be mailed at least thirty days prior to the meeting to each member at the address last furnished by him to the Society, provided he shall have furnished such address in writing to the Secretary-Treasurer.

(b) SPECIAL MEETINGS. Special meetings of the members may be called at any time in the discretion of the Board of Directors, and shall be held at the principal office of the Society in New York, or at such place or places as may be legally fixed by the Board of Directors.

(c) Notice of such special meeting and of the object or objects thereof shall be mailed to each member in like manner as notice of a regular meeting.

(d) QUORUM. One-third (⅓) of all the members in good standing present at any meeting in person or by proxy shall constitute a quorum at such meeting for all purposes, including the election of Directors.

(e) VOTING. No member or group of members of any one of the following interests: Central-station, manufacturing, jobbing or contracting, shall at any meeting vote more than twenty-five per cent (25%) of the proxies voting at such meeting.

(f) Cushing's Rules of Procedure shall prevail at all meetings.

ARTICLE II—BOARD OF DIRECTORS

SEC. 1. NUMBER—The Board of Directors of this Society shall consist of twenty members.

(a) The Board of Directors elected at the first annual meeting shall be composed of four classes of members, the first class to hold office for one year, the second class for two years, the third class for three years, and the fourth class for four years. Each class shall be composed of one representative of the central-

station interests, one representative of the manufacturing interests, one representative of the jobbing interests, one representative of the contracting interests, and one at large. There shall not at any time be more than five representatives of any one of the said interests on the Board. After the first annual meeting each and every director elected by the Society shall hold office for the term of four years and until another director is elected in his place; but the Board shall still be composed of four representatives of the central-station interests, four representatives of the manufacturing interests, four representatives of the jobbing interests, four representatives of the contracting interests, and four at large.

NOMINATING COMMITTEE

SEC. 2. The Board of Directors named in the Certificate of Incorporation, as promptly as possible after the adoption of these by-laws, shall appoint a nominating committee, to be composed of twelve members, three from each of the four interests named above, none of whom shall be members of the Board.

(a) The nominations for directors to be elected at the first annual meeting of the Society from each of the said interests shall be made respectively by the representatives of such interests on the said committee, and the nominations for directors at large shall be made by the committee as a whole. The nominating committee shall, at least sixty days before the first annual meeting of the Society, report in writing to the membership through the Secretary-Treasurer its nominations for the directors to be elected at such meeting, classifying the nominations as above provided.

(b) Any member who wishes to make additional nominations for directors from the interest which such member represents, or for directors at large, may send written notification of such nominations to the Secretary-Treasurer at least six weeks prior to the date for holding such meeting, and the Secretary-Treasurer shall thereupon, and at least thirty days before such date, notify the members of such additional nominations.

(c) The Board of Directors at their meeting held immediately after each annual meeting shall appoint a similar nominating

committee and the nominations for directors of the Society shall in every case be made in accordance with the above provisions for nomination at the first annual meeting.

Vacancies

Sec. 3. In case of any vacancies occurring in the Board of Directors, through death, resignation, disqualification or other cause, the remaining directors, by affirmative vote of a majority of their number, whether constituting a quorum or not, may elect a successor who must be chosen from the same interests as the retiring director, and shall preferably be a representative of the same membership as the retiring director. The director so elected shall hold office for the unexpired portion of the term of the retiring director and until his successor shall have been duly elected.

Meetings

Sec. 4. The Board of Directors may hold its meetings and may have one or more offices and keep the books of the Society at the principal office of the Society in the City of New York, or elsewhere, as it may from time to time determine, subject always to the provisions of the laws of the State of New York.

(a) Regular meetings shall be held on the second Wednesday of May and November, respectively, in each year. If such a day is a legal holiday, then the meeting shall be held on the next succeeding day which is not a legal holiday.

(b) Special meetings may be called by the President or any three directors.

(c) Each director shall furnish his address to the Secretary-Treasurer of the Society. Notice of the time and place of each regular meeting shall be sent by mail to each director at his address so furnished, at least 60 days prior to said regular meeting, and notice of the time and place of each special meeting shall be sent in the same manner and to the same address at least 30 days prior to such special meeting.

(d) Seven of the Board of Directors shall constitute a quorum at any meeting for the transaction of business.

Powers

Sec. 5. The management of all the affairs of the Society shall be entrusted to the Board of Directors except as otherwise provided by law, or by these by-laws. The acts and conduct, however, of all officers, employees and committees, except the affirmative action of the Executive Committee in the election of members, shall be at all times subject to review and approval by the Board of Directors.

(a) The Board of Directors shall have power to purchase or otherwise acquire for the Society any property, rights and privileges, which the Society is authorized to acquire, at such prices and on such terms and conditions and for such considerations as they think fit.

(b) The Board shall have power to determine who shall be authorized to sign on behalf of the Society notes, receipts, acceptances, endorsements, checks, releases, documents and any and all contracts, and shall make such authorization.

Executive Committee

Sec. 6. The directors shall elect from their number an Executive Committee, to consist of nine members, two representatives of whom shall be from the central-station interests, two from the manufacturing interests, two from the jobbing interests, two from the contracting interests, and one at large, and shall designate one of such nine members to be Chairman of the Committee; provided, however, that any firm, corporation or association represented in the membership shall have not more than one of its officers or employees a member of such Executive Committee; and provided, further, that in recognition of his valued services through many years toward the organization as expressed in The Society for Electrical Development, Inc., that nothing in these by-laws shall prevent Mr. J. Robert Crouse from being a member of the Executive Committee, or from holding any position in this Society, if elected. The members of the Committee and the Chairman thereof shall serve for a period of one year, and until the election of their successors. Any vacancy in the Executive Committee shall be filled, for the unexpired term of the retiring

member, by the vote of the remaining members of the Committee. A successor must be chosen from the same interests as the retiring member and shall preferably be a representative of the same membership as the retiring member.

(a) During the intervals between the meetings of the Board of Directors, the Executive Committee shall possess and may exercise all the powers of the Board of Directors in all cases in which specific directions shall not have been given by the Board of Directors.

The Executive Committee may hold special meetings at such times as may seem necessary, and must hold regular meetings at least once every two months, and at such place or places as shall best suit the convenience of a majority of its members.

(b) A majority of the Executive Committee shall constitute a quorum at any meeting for the transaction of business.

(c) A suitable notice of all special and regular meetings of the Committee must be given to all members thereof.

(d) The Executive Committee shall cause an examination of the records and accounts of the Society, of the Committee and the officers thereof, to be made at least once in each year, either by a committee elected or appointed from the members of the Executive Committee or by public accountants, as the Executive Committee may decide.

ARTICLE III—Officers

Sec. 1. Election and Appointment—The Board of Directors shall elect from their number a President and five Vice-Presidents; they shall appoint a Secretary-Treasurer and a General Manager, neither of whom need be members of the Board.

(a) Term of Office—The officers elected or appointed shall hold office for one year and until their successors are duly elected or appointed.

(b) Compensation—The President and Vice-President shall serve without compensation, and the compensation of the Secretary-Treasurer and of the General Manager shall be fixed by the Board of Directors.

(c) Duties—The President shall preside at all meetings of the

Board of Directors and members, and shall in general perform the duties usually incident to the office.

(d) The rank of the Vice-Presidents of the Society shall be decided after each annual election by lot, and the ranking Vice-President shall perform all duties of the President during the absence of the latter.

(e) The Secretary-Treasurer shall have charge of all records, files, reports, accounts, subscriptions, funds, and other properties relating to the financial affairs of the Society. He shall have custody of all the funds and securities of the Society which may come into his hands; and shall keep full and accurate accounts of all moneys received and paid out by him on account of the Society. He shall keep the minutes of all meetings of the members, of the Board of Directors and of the Executive Committee, and he shall attend to the giving and serving of all notices.

(f) The General Manager shall have the general management and supervision of the work of the Society subject to the direction of the Executive Committee and the Board of Directors. He shall submit at the monthly meetings of the Executive Committee and at the semi-annual meetings of the Board of Directors, a report on progress and plans, which report may be transmitted to the members.

(g) BONDS—The Secretary-Treasurer and the General Manager shall give such bonds to the Society for the faithful performance of the duties of their respective offices as the Executive Committee shall prescribe. The premiums for such bonds to be paid from the funds of the Society.

ARTICLE IV—SUBSCRIPTIONS

SEC. 1. The funds necessary to carry out the purposes of this Society shall be subscribed by the members, or the firms, corporations or associations they represent, the terms and conditions of such subscriptions to be fixed, subject to these by-laws by the Board of Directors or the Executive Committee.

(a) Central-station and manufacturers' interests represented by membership in this Society shall subscribe respectively to its funds at the rate of not less than one-fifteenth (1-15) of one per

cent (1%) of the gross amount of their respective annual sales, up to and including Twenty Million Dollars ($20,000,000) and at the rate of not less than one-twentieth (1-20) of one per cent (1%) on the gross amount of such sales in excess of Twenty Million Dollars ($20,000,000).

(b) Contracting and jobbing interests represented by membership in this Society shall subscribe respectively to its funds at the rate of not less than one-twentieth (1-20) of one per cent (1%) of the gross amount of their respective annual sales.

(c) ALTERNATIVE PLAN OF SUBSCRIPTION. Any member, whose gross annual sales amount to less than $20,000,000, preferring not to state the exact amount of his annual sales, may subscribe in accordance with the following classifications:

CLASS	YEARLY BUSINESS
A	Less than 15,000
B	15,000 to 25,000
C	25,000 to 50,000
D	50,000 to 75,000
E	75,000 to 100,000
F	100,000 to 250,000
G	250,000 to 500,000
H	500,000 to 1,000,000
I	1,000,000 to 2,000,000
J	2,000,000 to 4,000,000
K	4,000,000 to 6,000,000
L	6,000,000 to 8,000,000
M	8,000,000 to 10,000,000
N	10,000,000 to 12,000,000
O	12,000,000 to 15,000,000
P	15,000,000 to 20,000,000
Q	20,000,000 and over.

The subscription will be figured on the mean amount between the limits stated for each class except that Class A will be figured on the one amount stated, the percentages for each class to be the same as stated in Section I, paragraphs (a) and (b) above.

(d) On January 1st of each year the Secretary-Treasurer of this Society shall send to each member a card to be filled out by said member or by the firm, corporation or association he represents and returned prior to the following February 1st, stating the amount of his or its subscription for such year. The amount so stated shall be based on the gross sales made by such member or firm, corporation or association represented by membership, in the preceding calendar year, and shall be not less than at the rates above fixed, except that members choosing the alternative plan shall state the class in which their business comes, and when so stated, dues for the ensuing year become fixed in accordance with the above classification.

(e) In case any member or any firm, corporation or association represented by membership shall fail to fill out and return as aforesaid the card so sent to him or to it, the Board of Directors or the Executive Committee shall fix such subscription for each year and the decision of the Board of Directors or Executive Committee in any such case shall be final and binding.

(f) The Board of Directors and Executive Committee shall each have the power to exclude from the gross sales on which any subscription is based, the sales of any particular class of material which in the opinion of the Board of Directors or Executive Committee, as the case may be, should be excluded.

(g) Subscriptions to the Society shall be paid semi-annually in advance on the first days of February and August in each year.

(h) Any member or any firm, corporation or association represented by membership may resign and discontinue his or its subscription to the Society, to take effect at the end of any calendar year, by giving 60 days' written notice of his or its intention so to do, to the Secretary-Treasurer.

(i) The resignation of any firm, corporation or association represented by membership in the Society carries with it the resignation of its representatives, but the resignation of any representative of any firm, corporation or association shall not include the firm, corporation or association he represents, unless expressly so stated.

ARTICLE V—Expulsion

Sec. 1. Any member, or any firm, corporation or association represented by membership, who or which, in the judgment of the Board of Directors, has been guilty of a violation of the rules and regulations of the Society, or of acting in a manner prejudicial to its interests, may be expelled from the Society by a majority vote of the Board of Directors, thereby losing all rights and privileges of membership; provided, however, that any such member or firm, corporation or association represented by membership shall be furnished with a copy of the charges in question at least ten days before action is taken, and be permitted to appear before the Board of Directors, either in person or by counsel, in defense thereof. The expulsion of any firm, corporation or association shall include the expulsion of its representatives in membership, but the expulsion of any representative of any firm, corporation or association shall not include the firm, corporation or association he represents unless expressly so stated.

(a) Any officer or director may be removed from office by the Board of Directors, if, in the judgment of the Board of Directors, he has been guilty of a violation of the rules and regulations of the Society, has acted or is acting in a manner prejudicial to its interests.

ARTICLE VI—Reserve Funds of the Society

Sec. 1. From the funds received an amount not exceeding ten per cent (10%) of such funds received in any one year may be set aside by a majority vote of the Board of Directors as a special reserve or contingent fund, which fund, however, shall not be permitted to accumulate beyond an amount equal to the average yearly expenditures of the Society for the three preceding years. This reserve fund shall be invested in a savings account or in such securities as may be authorized by the Board of Directors, and the whole or any part thereof may, upon a majority vote of the Board of Directors, be applied to carrying on the work of the Society during any one year.

Sec. 2. In case of the expulsion or resignation of a member or

any firm, association or corporation so represented by membership, said member, or firm, association or corporation so represented, shall be entitled to receive no part of the reserve fund or any funds or other property of the Society, and shall as a result of such expulsion or resignation lose all interest therein.

(a) In case of the death of a member, his personal heirs, executors, administrators, legal representatives or assigns, shall not be entitled to receive any part of the reserve funds, or any part of any other funds or property of the Society and all interest of the deceased member in such funds or property shall cease and terminate with his death.

(b) On the death, resignation or expulsion of any member, representing a firm, association or corporation, all of his rights and interests in said Society and in the funds and property thereof shall pass and revert to and vest in his successor in membership, designated by the firm, association or corporation represented by said member.

(c) In case of the dissolution of the Society or other termination thereof, all of its funds and property, after the settlement in full of its existing obligations of every kind, shall be divided among its then members in proportion to the amount actually subscribed by said members during the three years immediately preceding the dissolution or other termination of the Society.

(d) Where a member represents a firm, association or corporation in membership, then and in that event such distribution shall be made to the firm, association or corporation represented by said member and not to the member himself, and such representing member shall have no interest, claim or right in said distribution whatsoever.

ARTICLE VII—Amendments

Sec. 1. These by-laws may be amended, repealed or added to by a majority vote of the members of the Society at any regular meeting or at any special meeting duly called for that purpose.

(a) These by-laws may be amended or added to by a majority vote of the Board of Directors, at any regular meeting of the Board

or at any special meeting thereof duly called for that purpose, provided, however, that the Board may not amend or add to these by-laws anything that would be inconsistent with them as adopted by the members of the Society, said by-laws so adopted, and provided, further, that such amendments or additions shall always be subject to the review and approval of the members.

(b) All proposed amendments, repeals or additions to the by-laws which it is desired should be passed upon by the members shall be presented to the Secretary-Treasurer of the Society in writing at least sixty (60) days prior to the regular or special meeting of the members, at which it is desired the same should be considered; and the Secretary-Treasurer shall send a notice which shall contain a copy of such proposal to the members of the Society at least two weeks prior to such meeting.

(c) Any amendment or addition to the by-laws made by the Board of Directors since the last meeting of the Society shall be presented at the next regular meeting of the Society, notice of same being issued to the members in accordance with Section (b) of this article.

(d) All proposed amendments or additions to the by-laws which it is desired should be passed upon by the Board of Directors shall be presented to the Secretary-Treasurer of the Society in writing at least thirty days prior to the regular meeting or special meeting of the Board at which it is desired the same should be considered, and the Secretary-Treasurer shall send a notice which shall contain a copy of such proposals to the members of the Board at least one week prior to such meeting.

The National City Bank.
of New York

OFFICE OF
THE PRESIDENT

New York

November 7th, 1913.

Society for Electrical Development,
New York, N. Y.

Gentlemen:-

Your letter of October 31st, with enclosure, has been received. I believe thoroughly in the purposes of the Society for Electrical Development. It is founded on right principles and it is constructive in every way. It is based upon the theory of broadening the scope of its members' activities and not of being in any way detrimental to one for the benefit of another. At the same time, its own success is so involved with good service to the public that mutual advantage must be derived from its activities. From the extension and the enlargement of central stations and the broader dissemination of electrical service, much economy directly beneficial to the public can be effected. In the education of the public along the line of increasing electrical facilities, diverse load factors can be obtained and service thus greatly cheapened. I believe the Society, while based upon the natural desire for more business for its members, is at the same time doing real public service, and it should receive hearty support.

Very truly yours,

Vanderlip

THE PHILADELPHIA ELECTRIC COMPANY

TENTH AND CHESTNUT STREETS

PHILADELPHIA

JOSEPH B. McCALL
PRESIDENT

December 11th, 1913.

Society for Electrical Development,
New York, N. Y.

Gentlemen:-

The object, underlying principles, and plans of the Society for Electrical Development appeal strongly to me as representing essential progress and refinement in more efficiently extending electrical service. The fact that selling costs of different branches of our industry, particularly the competitive branches, are either stationary or tend to increase from year to year, is a matter that warrents serious consideration for improved efficiency in distribution. This situation contrasts strongly with the tremendous strides made in Research, Engineering and Manufacturing.

I believe that this trade movement will not only greatly facilitate the extension of our business, but will, in doing this, develop a spirit of harmony and co-operation within the trade and toward the public of the greatest possible value.

Our membership in the Society is our strongest endorsement, and we shall be pleased, in addition, to use our influence to have the Central Stations well represented.

Yours very truly,

J B McCall

President.

GENERAL ELECTRIC COMPANY
SCHENECTADY, N. Y.

PRESIDENT'S OFFICE

December 8th, 1913.

Society for Electrical Development,
New York, N. Y.

Gentlemen:-

I have read with much interest your letter of Nov. 24th, and the articles describing the purposes of the Society for Electrical Development.

I am in hearty sympathy with every practical effort to extend the electrical business, and it would seem obvious that valuable work may be done along the lines proposed for the new Society. The electrical industry as the latest comer in the industrial field should lead in new business methods. All electrical workers, including competitors, have manifold interests in common; all are vitally interested in finding new fields to cultivate, in the reduction of waste, the promotion of honest business methods and the formation of correct public opinion.

While many have come to the conclusion that under modern conditions there is a necessary limit to the old competition; all will probably agree that there is no limit to the new competition, the competition in co-operation.

Wishing you success, I remain,

Yours very truly,

Elihu Root Jr.

HENRY L. DOHERTY & COMPANY
BANKERS
SIXTY WALL STREET
NEW YORK

December 19th, 1913.

The Society for Electrical Development,
New York, N. Y.

Gentlemen:-

The progress of civilization can be roughly measured by the extent other power is substituted for human labor.

The science of electricity has progressed far beyond its applied use.

There is no form of human labor which cannot now be either greatly reduced or entirely eliminated by electricity.

There is much to be done to extend the use of electricity which no single central station or manufacturer can afford to do, such as, for example, (a) the establishment of electrical departments in journals published in the interest of each branch of trade or industry, (b) the more general use of electric signs by national advertisers, (c) inducing the manufacturers of all machine tools and all other forms of power driven apparatus to equip with electrical drives -- and many other matters of equal or greater importance too numerous to mention here.

Your Society has been organized to undertake this general work in the interest of the entire industry, and it deserves the unqualified support of the entire industry.

It is not unreasonable to expect $10.00 of benefit for every $1.00 which is expended.

No one of proper spirit wants to neglect or shirk a plain duty and profit by the liberality and broad mindedness of others.

All of the electrical interests I represent are subscribers to your Society, and I believe that the list of those who subscribe the initial fund to start this work will constitute a Roll of Honor to be handed down to posterity and will always have an important part in the history of the business. I understand that over 80% of the initial fund has already been subscribed and I think this insures complete success.

Sooner or later I believe every progressive concern in the business will be a subscriber to this work, so why not ask everybody to subscribe now, voluntarily and spontaneously, and show the spirit of the true pioneer and builder?

Yours truly,

Henry L. Doherty

15 DEY STREET
NEW YORK

November 18th, 1913.

Society for Electrical Development,
New York, N. Y.

Gentlemen:-

Co-operation is the most effective factor of prosperity. Rational competition with co-operation is constructive and progressive, and is the only cure for our present evils and the only hope of the future.

If your society can help in bringing this about in Electrical Development it will have accomplished much, for in that field lies a great future.

Wishing you every success,

Very sincerely yours,

Theo Vail

Westinghouse Electric & Manufacturing Company

East Pittsburgh, Pa.

Office of
E. M. Herr,
President.

November 26th, 1913.

The Society for Electrical Development,
New York, N. Y.

Gentlemen:-

Referring to letter of the 15th inst. from Mr. J. Robert Crouse, the aims and purposes of the Society for Electrical Development have greatly interested me from their inception and I have watched your progress in this work with a great deal of interest.

I can assure you of my feeling that the purposes and aims of the Society, as outlined in the pamphlet which accompanied Mr. Crouse's letter cannot help but be of great advantage and value in the development of the electrical business.

I have recently returned from a short trip in the east and have been very much interested and pleased to see the slogan "Do It Electrically" prominently displayed in many places.

Wishing you success in your efforts to advance this Society, I remain,

Yours truly,

President.

GENERAL ELECTRIC COMPANY

WEST LYNN, MASS.

December 1st, 1913.

Society for Electrical Development,
New York, N. Y.

Gentlemen:-

I believe that the Society for Electrical Development has a great field before it in harmonizing interests and preventing ruinous competition by the methods which imply co-operation and mutual understanding. To do this effectively will, of course, require wise administration and a sympathetic attitude on the part of those connected with our industry. I have no doubt that if these are secured the benefits which may accrue will go far to counteract many of the difficulties under which business is at present conducted, and tend to the future development in the most healthful and hopeful way.

Very truly yours,

Elihu Thomson.

CHARLES P. STEINMETZ, A. M., PH. D
WENDELL AVENUE
SCHENECTADY, N Y

November 29th, 1913.

Society for Electrical Development,
New York, N. Y.

Gentlemen:-

Co-operation is now the basis of prosperity; competition, which has started our industrial progress, has become destructive and harmful to progress, if not limited and restrained by co-operation as the great economic force of modern industrial progress.

If your Society can help in bringing this about in electrical development it will have accomplished much, for in that field lies a great future.

Yours,

Charles P. Steinmetz

Western Electric Company
OFFICE OF THE PRESIDENT
15 DEY STREET
New York

December 4th, 1913.

Society for Electrical Development,
New York, N. Y.

Gentlemen:-

This is to acknowledge with thanks your favor of the 20th of November, with the booklet therein referred to, which I have looked over with interest.

Co-operation between the various elements of the electrical industry, such as the Society for Electrical Development proposes, is a broad and comprehensive undertaking, and if it is in any measure successful should be of much value to the central stations, manufacturers, distributors and contractors in the electrical business.

It is therefore with much interest that I will follow the development of the Society, and with best wishes for its success, remain,

Yours very truly,

President.

SOCIETY FOR ELECTRICAL DEVELOPMENT AN ACCOMPLISHED FACT

(Extract from "Electrical World," issue of February 28, 1914)

Its minimum fund of $200,000 having been subscribed, The Society for Electrical Development, Inc., will take up its task of educating the public to "do it electrically" on March 1. The membership on Thursday morning was 1300, apportioned as follows: central stations, 279; manufacturers, 173; contractors, 568; jobbers, 262, and miscellaneous, 18. Inasmuch as none of the pledges became binding until the $200,000 was subscribed, the Society is now engaged in sending out bills to subscribers, and the returns already coming in indicate a very healthy interest in the work for which the Society was formed. At the next meeting of the executive committee, appropriations will be made for carrying on definite branches of activity. It is certain that the program for a national advertising campaign to educate the reading public in the use of electricity will be one of the first to receive consideration. No let-up will be made in the effort to increase the membership. That campaign will be carried on simultaneously with the co-operative and educational work for which the organization was brought into being, because there is no limit to membership or to the funds which may be raised. By this means it is hoped not only to widen the influence of the Society, but to place at its disposal greater funds to make its work more extensive and immediately responsive. The general aims and plans of The Society for Electrical Development have been outlined in these columns before. Its headquarters are located at 29 West Thirty-ninth Street, New York City.

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